PB-216 478

SURVEY OF COMPOUNDS WHICH HAVE BEEN TESTED FOR CARCINOGENIC ACTIVITY. SECOND EDITION

Jonathan L. Hartwell

National Cancer Institute
Bethesda, Maryland

1951

DISTRIBUTED BY:

NTIS

National Technical Information Service
U. S. DEPARTMENT OF COMMERCE
5285 Port Royal Road, Springfield Va. 22151

PB 216 478

FEDERAL SECURITY AGENCY
PUBLIC HEALTH SERVICE

SURVEY OF COMPOUNDS WHICH HAVE BEEN TESTED FOR CARCINOGENIC ACTIVITY

Second Edition

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U S Department of Commerce
Springfield VA 22151

By Jonathan L. Hartwell
National Cancer Institute
National Institutes of Health
Bethesda, Md.

1951

PUBLIC HEALTH SERVICE PUBLICATION NO. 149

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON: 1951

14

CONTENTS

	Page
Introduction	1
List of abbreviations	4
Tabular review	4
Inorganic compounds	5
Organic compounds	28
Aliphatic	28
Monocyclic	47
Bicyclic	94
Tricyclic	106
Tetracyclic	124
Pentacyclic	194
Hexacyclic and higher	328
Azo compounds	337
Steroids	380
Heterocyclic compounds	466
Unclassified	503
Addenda	504
Bibliography	508
Compound index	555
Route index	570
Site-of-application index	571
Species index	574
Tumor-site index	578
Vehicle index	580

INTRODUCTION

The first edition of this "Survey" covered the literature on experimental carcinogenesis through 1939. Since that time the literature has increased so rapidly that the next eight years produced as much published work as did the whole period preceding. It became apparent that the first edition was rapidly becoming out of date. This fact, combined with the kindness with which investigators spoke of the first edition, prompted the Chairman of the Division of Medical Sciences of the National Research Council in 1947 to urge the Surgeon General of the U. S. Public Health Service that this work be revised and reissued. The present revised edition is the result, and it brings to latest form an idea originally worked on in 1936 by Mr. Bradford P. Geyer of Harvard University under the guidance of Dr. M. J. Shear of this Institute. The literature has been covered through 1947. While the publication of the present volume was not completed as rapidly as was wished, it is hoped that it will still be of considerable value to researchers.

The present book lists 1329 compounds of which 322 were reported to cause malignant tumors in animals and 35 others to induce only benign ones. It is interesting to compare these figures with the corresponding ones from the first edition, namely, 696 compounds of which 169 were said to produce cancer and 23 others to yield only papillomas. It is seen that of the 633 new compounds listed since the first edition, 153 have caused cancer--a proportion identical with that in the first edition. Accordingly, one assumption that might be made is that of the compounds yet to be tested, approximately one out of four may perhaps exhibit carcinogenic potency. The data obtained so far establish at least that carcinogenic potency is a property widely distributed among classes of chemical compounds, and suggest that more carcinogenic compounds will continue to be found among the new compounds investigated. This prediction is being confirmed by the recent discovery of remarkable new types of carcinogens by the English workers. It is regretted that these were not published in time to be included in the present publication.

This is a convenient place to discuss one of the pitfalls in the use of a survey like this to affirm or deny a proposed theory of carcinogenesis or a fancied correlation between carcinogenicity and chemical structure. There is a tendency on the part of some to consider carcinogenicity or lack of carcinogenicity as characteristic properties of chemical compounds. It is, sometimes, not realized that lack of carcinogenic potency implies such a lack only under limited experimental conditions. This has been well emphasized by Shear and Leiter (J. Nat. Cancer Inst. 2, 254 (1941)) as follows: ". . . . it is desirable to bear in mind that the statement to the effect that given compounds are noncarcinogenic does not necessarily mean that they are incapable of inducing malignant tumors;

Reproduced from best available copy.

it means only that the compounds did not give rise to tumors under the conditions of certain experiments of restricted scope. For example, the hundreds of such compounds examined for potency in Kennaway's laboratory in London and in this laboratory have, with few exceptions, been tested in mice only. The small number which were tested in several species of animals have given results which make clear that there are pronounced differences in the response of different species to the action of compounds carcinogenic in the case of the mouse. Moreover, there is evidence that some compounds which were negative in the mouse can induce tumors in other species. . .

"Furthermore, in the mouse itself, it is now abundantly evident that different tissues respond differently to the same compound. Some compounds have given negative results when applied to the skin but have been quite active when injected subcutaneously. With other compounds both techniques have given positive results but have brought out pronounced differences in the response of the skin and of the subcutaneous tissue. Compounds that are potent for the skin and subcutaneous tissue were found to be inactive when introduced directly into the liver. . . The susceptibility of the lungs. . . does not necessarily parallel that of the skin or the subcutaneous tissue.

"The mode of administration may also influence the results markedly. The dose may be too high as well as too low, and the most effective dose for one compound is not necessarily the same as that for another closely related one. The solvent or vehicle may affect the results profoundly. Media of complex nature, such as lard or sesame oil, may contain anticarcinogens or co-carcinogens. . . , and even chemically homogeneous vehicles may give different results. . . with the same dose of the same carcinogen administered to the same tissue of the mouse.

"Moreover, the sex of the animal is not without influence on the results. . . It is also conceivable that the life span of the mouse is a factor. Since some compounds which were negative during the first year gave rise to tumors during the second year of the experiment, it is possible that some compounds which gave negative results in the mouse might give positive results if its life span were longer. Diet, too, may be an important factor. . .

"For these various reasons the considerations, stated in an earlier paper. . . in a discussion of the concept "average time" of the latent period of carcinogens, are also applicable here, viz, the term "carcinogenic potency" as used in these studies is not to be considered as an invariable property inherent in a compound but is merely a summary of the results of particular experiments and is valid only for animals of the species, strain, sex, age, diet, etc., of the particular animal employed, as well as for the dose, menstruum, mode and site of application, etc., of the compound in question. . . Conclusions regarding the potency of any given compounds should therefore be interpreted in the light of the data upon which they are based."

Another pitfall is the attempt to carry over, without reservation, to man, conclusions based on animal experiments. We do not know whether man is more or less susceptible than mice to particular carcinogens. Some animal species, such as the rat, rabbit and dog, are much more resistant to certain chemical carcinogens than is the mouse, and vice versa, while in the monkey none of the powerful carcinogens has been shown to produce tumors. It would, therefore, be dangerous to conclude that man is resistant or susceptible to a given carcinogen merely on the basis of experiments with a single species of laboratory animal since we also know of several chemical agents which, as occupational hazards, are responsible for some human cancer and which have so far yielded negative results in laboratory animals. In the light of species specificity, a given compound, whether or not it is carcinogenic to animals, may or may not be capable of producing cancer in man. In view of the large number and variety of carcinogenic compounds, we must regard this multiplicity of newly developed and yet to be developed drugs, dyes, food additives and other chemical compounds with which we come in personal contact as possible cancer hazards, and we must reserve judgment on specific compounds until they are adequately investigated.

As in the first edition, the present work lists only single compounds. Such complex mixtures as tars, irradiated sterols and articles of diet are not included. Mixtures of two or more compounds given simultaneously are generally excluded. The guiding principle has been to omit such mixtures as render it difficult to determine to which constituent the given effects are due.

Since the mass of short term pharmacological observations in the literature are not informative as regards

tumor-producing potency, only compounds on which observations have been made for at least one month after the first administration have been included in the review.

The applications of chemical compounds to all vertebrates excepting fish have been considered. The action of carcinogens on fish, flowering plants, yeasts, bacteria, tissue cultures, isolated tissues, and the like has not been covered.

With regard to nomenclature of the compounds, the policy of the first edition has been followed. In general, the authors' names for the compounds have been retained. There are a few exceptions to this policy, two being the naming of the chrysenes and the acridines. Here there are several publications employing different systems of nomenclature. It was considered less confusing to the investigator using this review if a consistent method of naming and numbering were adopted; consequently, names have been altered to conform to the Chemical Abstracts system. In addition, trade names and alternate chemical names have been placed in the index of compounds to help in locating certain compounds.

Acknowledgment

The author wishes to take this opportunity to express his appreciation to the following: Dr. I. Berenblum of the Weizmann Institute, Israel, for the inclusion of data on 37 compounds not published elsewhere, and for suggestions for improvement in the organization of the tables and indexes; to Milton A. Pogorelskin formerly of the National Cancer Institute staff for culling much of the newer information from the original literature, and for assisting in the final stages of organization; to Georgianna Stetson formerly of the National Cancer Institute for the painstaking work of typing the manuscript as well as for assistance in proofreading and in the preparation of indexes. Thanks are also due to the library and to the translating section of the National Institutes of Health for their efficient services.

LIST OF ABBREVIATIONS

alk.--alkaline
avg.--average
b.u.--benzoate unit(s)
ca.--circa
carc.--carcinoma(s)
castr.--castrate
cc.--cubic centimeter(s)
corr.--corrected
C.P.--chemically pure
d.--day(s)
dec.--decomposes
epi.--epithelioma(s)
F--female
fig.--figure(s)
gm.--gram(s)
hr(s).--hour(s)
i.b.u--international benzoate unit(s)
I.M.--intramuscular
inj.--injection(s)
I.P.--intraperitoneal
I.T.--intratracheal
I.U.--international units
I.V.--intravenous
kg.--kilogram(s)
l.--left
M--male
m.c.--microcurie(s)
mg.--milligram(s)
mm.--millimeter(s)
mo(s).--month(s)
m.u.--mouse unit(s)
neg.--negative
pap.--papilloma(s)
P.O.--per os
r.--right
R.I.--Rhode Island
r.u.--rat unit(s)
S.C.--subcutaneous
sarc.--sarcoma(s)
soln.--solution
sq.--square
unpub.--unpublished
wk(s).--week(s)
yr(s).--year(s)

TABULAR REVIEW

A single asterisk(*) after a reference signifies that a preliminary report on the compound has been given by Shear, 1938b. A double asterisk (**) means that a preliminary report has been given by Shear, 1939.

Descriptive medical terms used are generally the various authors' own, and no attempt has been made to modify them to conform to a consistent nomenclature. The same is true of chemical names, although certain exceptions have been noted in the Introduction.

It cannot be emphasized too strongly that this review is not the primary source for the material given. In many instances, the necessity for selecting the material from a publication to fit the rigid form of a table has resulted in much important information as well as discussion and conclusions being left behind. Many papers are hardly recognizable from their excerpts given in this review. Consequently, it is strongly urged that users of this review consult the original references before coming to conclusions based on data cited herein.

COMPOUNDS TESTED FOR CARCINOGENIC POTENCY

A.--INORGANIC COMPOUNDS

1.--AMMONIUM PARATUNGSTATE

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Kinard and Aull, 1945	4 rats	---	M & F	.6912%[1] in food	P.O.	0	---	100 days

2.--AMMONIUM POTASSIUM SELENIDE

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Nelson, et al., 1943	18 rats	Osborne-Mendel	F	10 p.p.m. (as Se) in food	P.O.	3[2]	8 died in 11-1/2 mos.	24 mos.
Fitzhugh, et al., 1944	54 rats	--do--	---	10-40 p.p.m. (as Se) in food	P.O.	3[4]	22 alive at 8 weeks. 8 alive at one year	2 years

3.--AMMONIUM SULFAMATE

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Ambrose, 1943	25 rats	White	F	1-2% in food	P.O.	0		15 weeks

4.--ANTIMONY

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Hanzlik, and Presho, 1923b	2 pigeons	---	---	Ca. 1 g. per kg. body wt., as granules of metal	Gizzard	0		At least 64 days

5.--ARSENIC[3]

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Deels, 1923	Mice	---	---	Impregnated into thread	Through skin	0	---	150 days
Askanazy, 1926	7 rats	---	---	1:4,000,000 in water[8] 0.5 to 1 cc. every 2 to 5 days	S.C.	0[5]	1 died early	15 mos.
Schinz, and Uehlinger, 1942	1 rabbit	---	---	0.1- .15 g.	Thigh bone	0[6]	---	6 years

6.--ARSENIC TRIOXIDE

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Lipschütz, 1924	Mice	Gray	---	1.2% soln. in alcohol 2 times weekly	Skin painting	0[7]	---	Several mos.
Raposo, 1928a	10 rabbits	---	---	10% in vaseline daily	Skin painting	1 epi. 3 pap.	---	70 days
Raposo, 1926b	--do--	---	---	--do--	--do--	--do--	---	--do--
Calvery, et al., 1938	Dogs	---	---	88 and 142 mg. per kg. food	P.O.	0	---	Not over 299 days
Morris, H. J. and Wallace, 1938	Rats	Osborne-Mendel	---	215 mg. (calc. as arsenic) per kg. food	P.O.	0	---	Avg. of 42 days

1. Equivalent to 0.5% metallic tungsten
2. 2 liver carcinomas and 1 adenomatoid hyperplasia
3. Form not stated
4. 2 hepatic cell carcinomas; 1 adenomatoid hyperplasia, also cirrhosis
5. 1 atypical epithelial proliferation; 4 teratoids
6. Giant cell sarcoma with multiple nodules in lung and liver
7. Skin changes noted; melanin formation
8. Plus embryonic tissue

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
6.--ARSENIC TRIOXIDE (Continued)								
Morris, H. P. et al., 1950	Rats	--do--	---	26.8 and 215 mg. (calc. as arsenic) per kg. food	P.O.	0	---	Ca. 11 mos.
Pinner and Calvery, 1949	Rats	---	---	215 mg. (calc. as arsenic) per kg. food	P.O.	0	---	6 weeks
Fransen, et al., 1948	10 mice	A	---	Pellets (100%)	Lymph nodes	0	---	---
Friedewald and Rous, 1944b	12 rabbits	---	---	10% in vaseline for 6 mos. plus ca. 3.7% in aq. acetone for 15-1/2 mos. plus 1.8% in aq. gum acacia daily	Skin	3 pap.[1]	---	2 years
7.--ARSENIOUS ACID								
Lipschütz, 1924	Mice	Gray	---	0.01% in water; 1 cc. every 2 or 3 days	S.C.	0[2]	---	Several mos.
Carrel, 1925	16 fowls	---	---	1:5,000 to 1:250,000 in water[3]	I.M. thoracic area	0[12]	---	35 days
Carrel,[4] before 1926	6 fowls	---	---	1:125,000 to 1:250,000 in water[3]	Inj.	4 sarc.	---	---
Pentimalli, 1926	11 fowls fowls	--- ---	--- ---	1:10,000 to 1:500,000[5] in water[3] --do--[4]	I.M. breast --do--	0 0	--- ---	4 mos. --do--
White, A.A.M., 1927	6 fowls	---	---	1:50,000 to 1:200,000 in water, 2 cc.[3]	--do--	0[7]	3 alive at 6 mos.	6 mos.
Petroff and Krotkina, 1928	7 rats 6 rats 13 rats	--- --- ---	--- --- ---	1:50,000 to 1:100,000 in water[3] 1:5,000 in water[3] 1 cc. weekly 1:50,000 in water[3] 1 cc. weekly	S.C. S.C. & I.P. In Pararenal tissue in left kidney	1[8] 0[9] 0[10]	--- --- ---	22 mos. 9 mos. ---
Laclau and Matheu, 1929	10 fowls	White Leghorn, & R.I. Red Catalan mixed	---	[5]1:50,000 in water[3]	I.M. breast	0	---	31 days
Chabovitch and Fronicevic, 1938	5 fowls	---	---	0.000,005%[3]	S.C.	0[11]	---	Ca. 5 mos.
8.--ARSENOPYRITE								
Shimkin and Leiter, 1940	50 mice	A	M & F	5 mg. in saline	I.V.	0	---	6 mos.
9.--CADMIUM								
Hanzlik and Fresho, 1923b	1 pigeon	---	---	2.5 g. per kg. body wt., as granules of metal	Gizzard	0	---	At least 156 days

1. In 22 months; one papilloma in controls
2. Skin changes noted
3. Plus embryonic tissue
4. Cited by Cholewa, 1935
5. Calculated as Oxide
6. Plus inflammatory tissue
7. Embryonic pulp alone produces tumors
8. Other 6 had tumors which regressed
9. 2 tumors of intestine, 1 tumor of diaphragm; all animals with peritoneal nodules
10. Nodules at site
11. First tumor in pectoral muscle 46 days after injection; all tumors arose starting from 16-115 days after injection
12. Metastases to lungs and viscera

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
10.--CADMIUM CARBONATE								
Schwarz and Otto, 1925	4 cats	---	---	1-70 mg. (calc. as Cd) per kg. body wt. daily in food	P.O.	0	---	1-2 mos.
Prodan, 1932	6 cats	---	---	Susp. in gum acacia soln., 2-100 mg. (calc. as Cd) daily, in food, for 1-2 mos.	P.O.	0	---	1-5 mos.
11.--CADMIUM CHLORIDE								
Johns, et al., 1925	Rats	---	M & F	62.5-1000 p.p.m. (calc. as Cd) in food	P.O.	0	---	280 days
Schwartze and Ainberg, 1925	17 cats	---	---	5-100 mg. (calc. as Cd) daily	P.O.	0	---	64 weeks
Ellison, R.M., et al., 1961a	Rats	Albino	M	0.005%-0.05% (calc. as Cd) in food	P.O.	0	---	100 days
12.--CADMIUM OXIDE								
Schwarz and Otto, 1925	5 cats	---	---	2-11 mg. (calc. as Cd) per kg. body wt. daily	P.O.	0	---	4 mos.
Prodan, 1932	2 cats	---	---	Dust in air, few minutes at a time	inhalation	0	---	1 mo.
13.--CADMIUM PHOSPHATE								
Prodan, 1932	6 cats	---	---	Susp. in gum acacia soln., 2-100 mg. (calc. as Cd) daily, in food for 1 or 2 mos.	P.O.	0	---	1-5 mos.
14.--CADMIUM SUBSALICYLATE								
Hessel, 1926	1 rabbit	---	---	20 mg. (calc. as Cd) in oil	I.M.	0	---	8 weeks
15.--CADMIUM SULFATE								
Schwarz and Otto, 1925	4 rabbits	---	---	0.16 to 1.2 mg. (calc. as Cd) per kg body wt. daily	P.O.[1]	0	---	2 mos.
	1 cat	---	---	1.0 mg. (calc. as Cd) per kg. body wt. daily	P.O.[2]	0	---	2-1/2 mos.
	1 cat	---	---	0.8-2.4 mg. (calc. as Cd) per kg. body wt. daily	P.O.	0	---	4 mos.
16.--CALCIUM ARSENATE								
Morris and Wallace, 1958	Rats	Osborne-Mendel	---	215 mg. (calc. as arsenic) per kg. in food	P.O.	0	---	Avg. of 56 days
Rinner and Calvery, 1959	--do--	---	---	--do--	--do--	0	---	Ca. 8 weeks
Fairhall and Miller, J.M., 1961a	99 rats	---	M & F	Equiv. in arsenic of 10 mg. $PbHAsO_4$ in food daily	P.O.	0	51 alive at one yr.	2 years
17.--CALCIUM ARSENITE								
Bürgeler, 1959	10 rats	---	---	0.5% 0.2 cc. every 2 days	I.P.	0	---	250 days
	10 rats	---	---	--do--	S.C.	0	---	--do--

1. By stomach tube

2. In gelatin capsule

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
18.--CALCIUM CHLORIDE								
Addis, et al., 1926	Rats	---	M & F	2% in food	P.O.	0	---	330 days
19.--CERIUM[1]								
Lisco, et al., 1947	Mice, rats & rabbits	---	---	---	I.M. or S.C.	Tumors[2]	---	Ca. 200 days
20.--CHROMITE								
Shimkin and Leiter, 1940	50 mice	A	M & F	5 mg. in saline	I.V.	0	---	6 mos.
21.--CHROMIUM								
Schinz and Uehlinger, 1942	3 rabbits	---	---	As metal	Thigh bone	1 sarc.[3]	---	4-6 years
22.--COBALT[4]								
Bernard, 1936	Rats	White	---	0.05 to 0.1% in saline	Bone marrow	0		3 mos.
Schinz and Uehlinger, 1942	3 rabbits	---	---	0.1-0.15 g. (average amounts)	Thigh bone	2 sarc.[5]	All alive at 4 years	4 years
23.--COPPER SULFATE								
Feline and Anissimova, 1940 a, b, & c	38 fowls	---	M	5% aq. soln., 0.15 cc.	Testes	1[6]	15 died in 10 days	74 days
	38 fowls	---	M	3 or 5% aq. soln., 0.15 cc.	Testes	1[6]	15 died in 10 days	74 days
	--do--	---	M	--do--	--do--	--do--	15 died early	--do--
24.--GOLD CALCIUM THIOMALATE								
Block, et al., 1944	3 rats	White	---	1 mg. 14 daily injections	I.M.	0	---	57 days
	--do--	--do--	---	--do--	--do--	0	---	85 days
25.--GOLD SODIUM THIOSULFATE								
Block, et al., 1944	3 rats	White	---	1 mg. 14 daily injections	I.M.	0	---	57 days
	--do--	--do--	---	--do--	--do--	0	---	85 days
26.--GOLD SULFIDE								
Block, et al., 1944	3 rats	White	---	1 mg. 14 daily injections	I.M.	0	---	57 days
	--do--	--do--	---	--do--	--do--	0	---	85 days
27.--GOLD THIOGLUCOSE								
Block, et al., 1944	3 rats	White	---	1 mg. 14 daily injections	I.M.	0	---	57 days
	--do--	--do--	---	--do--	--do--	0	---	85 days

1. Radioactive isotope 144; form not stated
2. Sarcomas of the skeletal system
3. Sarcomas of the skeletal system; also, spindle cell sarcoma of mediastinum and a periosteal pelvic synovioma; periosteal spindle-cell sarcoma of the femur
4. Form not stated
5. Multicentric adenocarcinoma of the lungs with peritoneal metastases
6. Teratoid

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
28.--HYDROCHLORIC ACID								
Winternitz[1]	Animals	---	---	Vapors	Inhalation	Some[2]	---	---
Marat, 1925	52 mice 47 mice Rats	--- --- ---	M F ---	5 to 10% in water --do-- --do--	On skin of back --do-- --do--	3 8 5	--- --- ---	25 to 46 weeks --do-- ---
Bogen and Loomis, 1935	Mice	White	---	Concentration not stated; twice weekly	Skin painting	0	5 alive at 6 mos.	Over 1 year
Surtzeff, et al., 1960	8 mice	A,D,C57, and ...	M	0.25 cc. aq. soln. buffered to pH4 with potassium acid phthalate 6 times weekly	S.C.	4 sarc.[3]	---	16 mos.
Machle, et al., 1942	5 rabbits 5 guinea pigs 1 monkey	--- --- ---	--- --- ---	0.16 mg. per l. 6 hrs. per day, 5 days a week --do-- --do--	Inhalation --do-- --do--	0 0 0	--- --- ---	4 weeks --do-- --do--
29.--HYDROCYANIC ACID								
Shakhnovskaya, 1944	10 cats	---	F	0.002-0.056 mg. daily	Skin painting	0	---	Ca. 2-1/2 mos.
30.--HYDROGEN SULFIDE								
Moser, 1960	Dogs	---	---	In air, 7 hours, daily	Inhalation	0	---	12 weeks
31.--INDIUM								
McCord, et al., 1942	5 rabbits	---	---	10 mg. powdered metal	S.C.	0	---	2 mos.
32.--INDIUM CHLORIDE								
McCord, et al., 1942	1 rabbit	---	F	1.0 mg. (calc. as In)	I.V.	0	---	40 days
33.--INDIUM SULFATE								
McCord, et al., 1942	1 rabbit	---	M	1.0 mg. (calc. as In)	I.V.	0	---	40 days
34.--IODINE								
Rosenstirn, 1926	72 mice 51 mice 97 mice	Longacre Fordham Strong	--- --- ---	5 to 10% in alcohol plus soln. in potassium iodide; daily to 2 or 3 times weekly --do-- --do--	On skin of back --do-- --do--	0 0 0	--- --- ---	15 mos. --do-- --do--
35.--IRON OXIDE								
Campbell, J.A., 1940	76 mice	Mixed	M & F	As dust in air, 50 hrs. weekly for 1 yr.	Inhalation	C[4]	55 alive at 400 days	852 days
Campbell, J.A., 1943	50-60 mice	---	M & F	As dust in air, 50 hrs. weekly	Inhalation	C[5]	---	At least 10 mos.
36.--LEAD								
Marzille, 1925a	55 pigeons	---	---	0.16 to 2.1 g. (as metal) per kg. body wt.	Crop	0	---	150 days

1. Cited by Joannovic, 1927
2. Bronchial carcinomas
3. First at 10.5 mos. in A strain
4. Of the lung in higher percentage than in controls
5. Pulmonary, increase over controls; also metastases

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
37.--LEAD ACETATE								
Hanzlik, and Presho, 1923a	1 pigeon	---	---	0.42 g. (calc. as lead) per kg. body wt.	Crop	0	---	At least 50 days
	2 pigeons	---	---	0.03-0.08 g. (calc. as lead) per kg. body wt., per day, in food	P.O.	0	---	At least 41 days
Calvery, et al., 1938	Dogs	---	---	12.8 to 64 mg. (calc. as lead) per kg., in food	P.O.	0	---	Not over 229 days
Morris, H.P., et al., 1938	Rats	Osborne-Mendel	---	64 and 512 mg. (calc. as lead) per kg., in food	P.O.	0	---	Ca. 11 mos.
Finner and Calvery, 1939	Rats	---	---	2.56 g. (calc. as lead) per kg. in food	P.O.	0	---	Ca. 7 weeks
	24 dogs	---	---	Small doses in food	P.O.	0	Several died early	Over 1 year
38.--LEAD ACETATE, BASIC								
Risi, 1937	Rabbits	---	---	1.5% suspension in water, weekly[1]	On fur and skin of abdomen	0[2]	---	6 mos.
39.--LEAD ARSENATE								
Calvery, et al., 1938	Dogs	---	---	64 mg. (calc. as lead) per kg. in food	P.O.	0	---	Not over 229 days
Grant, et al., 1938	5 dogs	---	---	Small doses in food	P.O.	0	---	Over 1 year
	Rats	Osborne-Mendel	M & F	12.8 to 512 mg. (calc. as lead) per kg. in food	P.O.	0	---	Avg. of 93 days
Laug and Morris, 1938	Rats	Osborne-Mendel	M & F	0.61 to 2,640 mg. (calc. as lead) per kg. in food	P.O.	0	---	63 to 101 days
Finner and Calvery, 1939	Rats	---	---	3.53 g. (calc. as lead) per kg. in food	P.O.	0	---	Ca. 12 weeks
Fairhall and Miller, J.W., 1941a	49 rats	---	M	Ca. 10 mg. in food, daily	P.O.	0	27 alive at one year	2 years
40.--LEAD AZIDE								
Fairhall, et al., 1943	30 rats	White	---	20-60 mg. daily	P.O.	0	High mortality in higher doses	44 weeks
41.--LEAD CARBONATE								
Hanzlik, and Presho, 1923a	1 pigeon	---	---	0.36 g. (calc. as lead) per kg. body wt.	Crop	0	---	At least 40 days
	1 pigeon	---	---	0.017 g. (calc. as lead) per kg. body wt. daily in food	P.O.	0	---	At least 38 days
Fairhall and Miller J.W. 1941a	55 rats	---	M	Equiv. in lead of 10 mg. $PbHAsO_4$ daily in food	P.O.	0	41 alive at 1 year	2 years
Fairhall and Miller J.W., 1941b	60 rats	White	---	15 mg. in food daily	P.O.	0	---	66 days

1. Containing also ammonium chloride, sulfur, glycerine and sodium hyposulfite

2. No skin lesions. Subcutaneous injections into guinea pigs caused death in 5 days

Reference	Animal	Strain or type		Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
41.--LEAD CARBONATE (Continued)								
Fairhall et al., 1943	10 rats	White	---	60 mg. (as lead) daily	P.O.	0	2 dead at 44 weeks	44 weeks
42.--LEAD CHLORIDE								
Hanzlik and Presho, 1923a	1 pigeon	---	---	1.3 g. (calc. as lead) per kg. body wt.	Crop	0	---	Over 65 days
	2 pigeons	---	---	0.015 and 0.04 g. (calc. as lead) per kg. body wt. per day	P.O.	0	---	190 days
43.--LEAD IODIDE								
Hanzlik and Presho, 1923a	3 pigeons	---	---	0.01 to 0.03 (calc. as lead) per kg. body wt. daily in food	P.O.	0	---	At least 128 days
44.--LEAD NITRATE								
Haddow et al., 1937	13 rats	Ister	M & F	4 mg. in water	I.P.	0	---	36 days
45.--LEAD SULFIDE								
Hanzlik and Presho, 1923a	3 pigeons	---	---	Ca. 0.02 g. (calc. as lead) per kg. body wt. daily in food	P.O.	0	---	At least 93 days
46.--MANGANESE								
Hanzlik and Presho, 1923b	1 pigeon	---	---	Ca. 1 g. per kg. body wt. as granules of metal	Gizzard	0	---	At least 130 days
47.--MESOTHORIUM[1]								
Sabin, et al., 1932	4 rabbits	---	---	7.7 micrograms in saline, monthly	I.V.	1[2]	---	19 mos.
Schürch and Uehlinger, 1934	Rabbits	---	---	3 to 5 micrograms in vaseline	In marrow of femur	1 sarc.	---	19 mos.
Schürch and Uehlinger, 1935	8 rabbits	---	---	2 to 5 micrograms in about 0.4 cc. vaseline	--do--	3 sarc.[3]	---	22 mos.
Schürch and Uehlinger, 1936a	8 rabbits	---	---	2 to 5 micrograms in vaseline	--do--	Sarcomas[4]	---	36 mos.
Schürch and Uehlinger, 1937	18 rabbits	---	---	--do--	--do--	9 sarc.[5]	---	3 years
Uehlinger and Schürch, 1938a	24 rabbits	---	---	--do--	--do--	10 sarc.[6]	8 died early 6 alive neg. at 6 years	6 years
	10 rabbits	---	---	0.1 to 4 micrograms in vaseline	--do--	4 sarc.	3 died early	Over 29 mos.
	11 rabbits	---	---	5 micrograms in vaseline	Spleen	1 sarc.[7]	8 died early	Over 31 mos.
	12 rabbits	---	---	--do--	Liver	1 sarc.[8]	7 died early	Over 25 mos.

1. Form not stated
2. Of bone marrow of right femur
3. Metastases to lungs, liver, inguinal lymph nodes, spleen, kidneys, mediastinum, diaphragm; etc.
4. First tumor at 19 months; metasta es to lungs
5. Tumors described, with metastases to lung, kidney, spleen and liver
6. First tumor in 18 months
7. With metastases; also 2 fibroses of spleen
8. With metastases

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
47.--MESOTHORIUM[1] (Continued)								
Uehlinger and Schürch, 1938a	10 rabbits	---	---	5 micrograms in vaseline	Stomach	1 sarc.[2]	2 died early	Over 30 mos.
	52 rabbits	---	---	--do--	Testis	0	At least 15 died early	17 mos.
	21 rabbits	---	---	--do--	Pleura	0	7 died early	32 mos.
Uehlinger and Schürch, 1938b	Less than 16 rabbits	---	---	--do--	In marrow of femur	3 sarc.[3]	---	36 mos.
	7 rabbits	---	---	0.1 to 2 gamma in 0.2 cc. vaseline	--do--	4 sarc.	---	43 mos.
	3 rabbits	---	---	5 micrograms in 0.2 cc. vaseline	Spleen	1 sarc.	---	24 mos.
	5 rabbits	---	---	--do--	Liver	1 sarc.	25 mos.	25 mos.
	8 rabbits	---	---	--do--	Stomach	2 sarc.	---	29 mos.
	7 rabbits	---	---	--do--	Testis	0	---	---
	20 rabbits	---	---	--do--	--do--	1 sarc.[4]	---	12-15 mos.
	10 rabbits	---	---	--do--	Pleura	0	---	---
48.--NICKEL								
Hanzlik and Presho, 1923b	3 pigeons	---	---	1-2.7 g. per kg. body wt., as granules of metal	Gizzard	0	---	At least 182 days
Burrows and Boyland, 1938	2 rabbits	---	F	---	Nasal insufflations	1[5]	---	1445 days
49.--NITRIC ACID								
Bogen and Loomis 1935	Mice	White	---	Concentration not stated; twice weekly	Skin painting	0	5 alive at 6 mos.	Over 1 year
50.--OLIVINE								
King et al., 1945a	9 rats	---	---	50 mg. in suspension in 2 cc. saline	Lungs[6]	0	4 alive at 5 mos.	5 mos.
51.--PHOSPHORUS[1]								
Daels, 1923	Mice	---	---	Impregnated into thread	Thru skin	0	---	150 days
52.--PHOSPHORUS[7]								
Sollmann, 1925	32 rats	---	M & F	0.0027 mg.-0.072 mg. per kg. body wt. daily in food for 4 mos.	P.O.	0	23 alive at 22 weeks	5-6 mos.
Adams, and Sarnat, 1940	Ca. 17 rabbits	---	----	0.6 mg. in coated pill, daily	P.O.	0	---	13-117 days
	14 rats	---	---	0.01% in cod liver oil	P.O.	0	---	22-57 days
Fleming et al., 1942	Rats	---	M & F	0.05 to 3.2 mg. per kg. body wt. per day in olive or peanut oil, 2 times weekly	S.C.	0	---	More than 610 days
	Guinea pigs	---	---	0.05 to 0.4 mg. per kg. body wt. per day in olive or peanut oil 2 times weekly	S.C.	0	---	---
	24 rats	---	---	0.2 to 1.6 mg. per kg. body wt. per day in peanut oil in food daily	P.O.	0	---	512 days

1. Form not stated
2. With metastases. Also 1 osteogenic sarcoma of spleen and liver, and 2 chronic stomach ulcers.
3. With metastases
4. Osteogenic sarcoma of pelvis.
5. Multiple uterine tumors. Also possible primary cancer of mammary gland
6. By intratracheal insufflation
7. White or yellow phosphorus

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
53.--PLUTONIUM[1]								
Lisco, et al,1947	Mice	---	---	0.05 to 0.5 micrograms per gram	S.C. or I.M.	0[2]	---	Ca. 200 days
	Mice, rats, rabbits	---	---	0.05 to 4.5 micrograms per gram	Injected	0[3]	---	--do--
54.--POLONIUM[4]								
Lacassagne et al., 1925	14 rabbits	---	---	100-500 e.s.u.	I.V., I.P. or S.C.	0	Many died in 12 days	3.5 mos.
55.--POTASSIUM ARSENITE								
Leitch and Kennaway, 1922a	Rats	---	---	In food	P.O.	0	High mortality	---
	Mice	---	---	--do--	--do--	0	--do--	---
	100 mice	---	---	0.12% in alcohol	Skin painting	1[5]	67 dead in 5 mos.	At least 3 mos.
Leitch and Kennaway, 1922b	Mice	---	---	0.12% (calc. as arsenic trioxide) in alcohol 3 tim weekly	--do--	1 epi.	---	5.5 mos.
Askanazy, 1926	4 rats	---	---	1% in water[6] 1 to several cc.	P.O.	2[7]	3 died early	13 mos.
	5 rats	---	---	---	P.O.	2[8]	---	2.5 years
Büngeler, 1930	70 rats	---	---	0.3% soln. in water; 4-5 cc. daily	P.O.	0	---	250 days
	40 mice	---	---	---	P.O.	0	---	Ca. 17 mos.
Puccinelli, 1931	10 rats	---	---	1% in water; 1 cc. daily in food	P.O.	0	---	0.5 to 17 mos.
Cholewa, 1935	20 mice	White	---	0.052 mg. daily	P.O.	2[9]	---	---
	2 rabbits	---	M	In water, daily	S.C. Neck	1[10]	---	6 mos.
Zurhella, E., 1939	2 fowl	---	M	1 cc. Fowler's soln., weekly to 3 times weekly	S.C.	0	---	59 days
Hueper, 1942a	20 rats	---	---	In drinking water	P.O.	0[11]	---	23 mos.
56.--POTASSIUM HYDROXIDE								
Narat, 1925	29 mice	---	M	3 to 6% in water	On skin of back	4	---	25 to 46 weeks
	52 mice	---	F	--do--	--do--	8	---	--do--
	Rats	---	---	--do--	--do--	0	---	---
57.--POTASSIUM THIOCYANATE								
Lindberg, H.S. et al., 1941	12 dogs	---	---	0.3 g. daily	P.O.	0	---	27 weeks[12]
58.--d-QUARTZ								
King et al., 1945b	7 rats	---	---	50 mg. in suspension in 2 cc. saline	Lungs[13]	0	---	147 days

1. Radioactive isotope 239; form not stated
2. Malignant fibrosarcomas of the skeletal system
3. Bone tumors. Latent period, 200 days
4. Form not stated
5. Metastases to lung
6. Plus embryonic tissue
7. 1 adenocystoma and 1 sarcoma of stomach wall
8. Stomach
9. Lung blastomas
10. Sarcoma of the ear
11. Trichoepitheloma in subcutaneous tissue
12. Pathological changes described
13. By intratracheal insufflation

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
59.--I-QUARTZ								
King et al., 1945b	7 rats	---	---	50 mg. in suspension in 2 cc. saline	Lungs[1]	0	---	147 days
60.--RADIUM[2]								
Daels and Biltris, 1931	25 rats	---	---	1:100,000 in paraffin[3]	S.C.	0	---	12 mos.
	60 rats	---	---	1:1,000 aqueous soln. of soluble salt plus 1:150,000 insoluble salt, on silk thread	S.C.Abdominal cavity	1	40 died neg. in 3 mos.	8 mos.
	25 guinea pigs	---	---	1:110,000 in paraffin[3]	In brain	5	10 died in 6 mos.	Ca. 2 yrs
Schürch and Uehlinger, 1931	1 rabbit	---	F	1 mg. in platinum needle	S.C. near jaw-bone	1 sarc.	---	1.5 years
Biltris, 1933	15 guinea pigs	---	---	Collodion strips enclosing the radium	Liver	9 epi.[4]	6 died neg. in 12 mos.	26 mos.
Daels, 1933	Mice	---	---	Aqueous soln. in glass tube	---	Sarc. & epi.[5]	---	At least 10 mos.
	Rats	---	---	Impregnated threads covered with collodion	---	Sarc.[6]	---	At least 22 mos.
	Guinea pigs	---	---	Threads covered with radium-containing collodion	---	Sarc. and epi.[7]	---	At least 30 mos.
Petroff and Krotkina, 1933	12 guinea pigs	---	M & F	0.4 to 1.8 micrograms in glass tube	Gall bladder	2[8]	---	3 years, 4 mos.
Mottram, 1935	12 fowls	---	---	Applicator permitting emission of alpha and beta radiation; weekly	Breast or upper abdomen	3 sarc.[9]	7 alive neg. at 2.5 yrs.	3.5 years
Schürch and Uehlinger, 1935	14 rabbits	---	---	2 to 5 micrograms in about 0.4 g. of vaseline	S.C. near jaw-bone	2 sarc.[10]	---	21 mos.
Ross, 1936	13 rabbits	---	---	0.1 mg. in platinum tubes	Thoracic wall	6[11]	4 died or killed early	135.5 weeks
Schürch and Uehlinger, 1936a	14 rabbits	---	---	2 to 5 micrograms in vaseline	Bone marrow (femur)	Sarc.[12]	---	36 mos.
Hellner, 1938	5 rabbits	---	---	In vaseline plugs	In marrow	3 sarc.	2 died neg.	Over 3 years
Uehlinger and Schürch, 1938b	Less than 16 rabbits	---	---	5 micrograms in 0.2 cc. vaseline	In marrow of femur	7 sarc.[13]	---	50 mos.
61.--RADIUM BROMIDE								
Dominici et al., 1913	Less than 21 rabbits	---	---	20 to 60 micrograms	I.V. or I.M.	0	---	5 to 165 days

1. By intractracheal insufflation
2. Form not stated
3. Also containing 1:300 of arsenic
4. Of biliary tract. Lung metastases. Also 2 tumors of spleen, 3 sarcomas (kidney, meninges, etc.)
5. Time of appearance 6 to 10 months
6. Time of appearance 8 to 22 months
7. Time of appearance 12 to 30 months
8. Liver adenocarcinomas; metastases to lung
9. First in 13 months
10. Metastases to lungs, pleura, etc.
11. 4 sarcomas and 2 carcinomas. First in 97 weeks
12. First tumor in 19 mos; metastases to lungs
13. Nearly all with metastases

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
61.--RADIUM BROMIDE (Continued)								
Daels, 1925	10 rats	---	---	0.005% in water in glass tube	S.C.	1 sarc.	8 alive at 7 mos.	At least 7 mos.
Daels, 1926	25 mice	---	---	--do--	S.C.	0	All died in 6.5 mos.	6.5 mos.
	15 mice	---	---	--do--	S.C.	1 sarc.	---	8 mos.
	15 mice	---	---	0.01% in water in glass tube	S.C.	0	3 alive at 9 mos.	12 mos.
	23 mice	---	---	0.01% in water in glass tube	S.C.	2 sarc.	7 alive at 6 mos.	8.5 mos.
Daels and Baeten, 1926	Mice	White	---	0.01% in water in glass tube	S.C.	1 epi.[1]	---	At least 322 days
Daels, 1927	10 rats	---	---	5 mg. in water in glass tube	S.C.	1 sarc.	8 alive at 7 mos.	At least 7 mos.
Daels and Biltris, 1927	25 guinea pigs	---	---	1:100,000 in paraffin[2]	S.C.	0	---	---
	25 rats	---	---	--do--	S.C.	0	---	---
	25 mice	---	---	--do--	S.C.	1 sarc.[3]	---	---
Daels and Biltris, 1931	25 guinea pigs	---	---	1:7500 in glass tube	Brain	1 sarc.	9 alive at 2 years	4 years
	36 guinea pigs	---	---	1:10,000 in glass tube; 2 tubes	I.P.; in pleura[4]	1[5]	13 alive at 1 year	4 years
	40 rats	---	---	1:15,000 in glass tube	S.C.	0	All died in 15 mos.	15 mos.
	27 rats	---	---	1:7500 in glass tube	Brain	0	All died in 12 mos.	12 mos.
62.--RADIUM CHLORIDE								
Sabin et al., 1932	5 rabbits	---	---	5.1 micrograms in saline monthly	I.V.	1 sarc.[6]	---	19 mos.
Thomas, H.E. and Bruner, F.H., 1933	8 rats	Albino	M & F	40-60 micrograms (total dose) in saline during 126-191 days	S.C.	0	---	258 days
Dunlap, C.E. et al., 1944	13 rats	Wistar	M	100 micrograms (total dose) in aq. soln. during 20 days	P.O.	9[7]	---	---
63.--RADIUM SULFATE								
Dominici and Faure-Beaulieu, 1908	Rabbits	---	---	Suspension in saline	I.V., Ear; I.T.; S.C., ear; in parenchyma or spleen	0	---	67 days
Dominici and Faure-Beaulieu, 1910	1 rabbit	---	---	0.05 mg.	I.V., ear	0	---	18 mos.

1. In 322 days; metastases to right axilla and left groin
2. Also containing 1:3000 of arsenic trioxide
3. Mammary carcinoma arising at 6 mos.
4. 1 tube in each organ
5. Of liver; actually at site due to error in technique
6. Of marrow of left humerus; other changes noted
7. Osteogenic sarcoma at 253-426 days. Metastases in 2 cases

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
63.--RADIUM SULFATE (Continued)								
Dominici et al., 1913	Less than 21 rabbits	---	---	0.015 to 0.046 mg.	I.V. or I.M.	0	---	5 to 165 days
Daels 1925	24 mice	---	---	1:55,000 in paraffin	S.C.	0	All died in 4 mos.	4 mos.
	60 mice	---	---	--do--	S.C.	2[1]	---	9 mos.
	6 rats	---	---	60 mg. powder in glass tube[2]	S.C.	0	All died in 6 mos.	6 mos.
	10 rats	---	---	50 gm. powder in glass tube	S.C.	1 sarc.	4 alive at 7 mos.	12 mos.
	12 rats	---	---	--do--	S.C.	0	---	10 mos.
	5 rats	---	---	--do--	S.C.	0	1 alive at 14 mos.	14 mos.
Daels, 1926	Mice	---	---	1:40,000 in paraffin	S.C.	0	All died in 5 mos.	5 mos.
Barlow[3]	Mice	---	---	---	Inj.	1 sarc.	---	---
Daels, 1927	24 mice	---	---	With talc in paraffin	S.C.	0	---	4 mos.
	60 mice	---	---	--do--	S.C.	2[1]	---	9 mos.
	6 rats	---	---	6 micrograms in glass tube	S.C.	0	All died in 6 mos.	4-6 mos.
	10 rats	---	---	5 micrograms in glass tube	S.C.	1	4 alive at 7 mos.	13 mos.
	12 rats	---	---	--do--	S.C.	0	---	10 mos.
	5 rats	---	---	--do--	S.C.	0	1 alive at 14 mos.	14 mos.
Daels and Biltris, 1931	37 rats	---	---	On silk thread	Thru abdominal cavity	3 sarc.	High mortality	22 mos.
	30 guinea pigs	---	---	0.05 microgram per sq. mm. on collodion strips	S.C., mammary region	0[4]	---	16 mos.
	75 guinea pigs	---	---	--do--	Brain	0	High mortality	1.5 years
	18 guinea pigs	---	---	0.2 microgram per sq. mm. on collodion strips	--do--	0	--do--	1.5 years
	24 guinea pigs	---	---	0.05 microgram per sq. mm. on collodion strips	Liver	0	All died of infection	6 mos.
	22 guinea pigs	---	---	--do--	Kidneys	2	13 died in 5 mos.	Ca. 22 mos.
	16 guinea pigs	---	---	0.2 microgram per sq. mm. on collodion strips	Liver	1	7 died in 8 mos.	21 mos.
	10 guinea pigs	---	---	--do--	Kidneys	0	4 died in 6 mos.	9 mos.
	17 rats	---	---	1:10,000 in glass tube	S.C.	0	All died in 12 mos.	12 mos.
Rosenthal, M. and Grace, 1936	4 rabbits	---	M & F	100 micrograms (total dose) in glycerine suspension over 90 days	P.O.	0	---	3-18 mos.

1. Paraffin tumors, not clearly malignant
2. Powder consists of 1 mg. radium sulfate in 10 g. of talc
3. Unpublished results cited by Daels, 1926 and by Schürch and Uehlinger, 1931
4. Most animals eliminated the strip

Reference	Animals	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
63.--RADIUM SULFATE (Continued)								
Daels and Biltris, 1937	159 fowls	White Leghorn	---	0.2 to 0.02 micrograms per sq. mm. on collodion strips	Liver and liver plus I.M. breast	2 sarc.[1]	All died in 12 mos.	Ca. 5 years
	Guinea pigs	---	---	0.2 to 0.8 micrograms per sq. mm. on collodion strips	---	4[2]	---	---
Hellner, 1937	Rabbits	---	---	20-45 mg. in platinum-iridium tube, repeated applications	Condyle of femur	1 sarc.[3]	---	At least 2-1/4 years
64.--RADON								
Dobrovolskaia-Zavadskaia, 1935a	47 mice	R III	F	In tube	Left groin	11[4]	---	9 to 21 mos.
Lacassagne and Nyka, 1937b	Rabbits	---	---	0.69 to 1.08 m.c. in glass tube	Hypophysis	3 sarc.[5]	---	15 mos.
Dobrovolskaia-Zavadskaia and Adamova, 1938a	32 mice	17 mc.	F	0.07 to 0.12 m.c. in tube	S.C. left groin	3	9 alive at 12 mos.	21 mos.
	21 mice	39	M	--do--	--do--	2	7 alive at 12 mos.	27 mos.
	15 mice	39	F	--do--	--do--	2	--do--	--do--
	20 mice	41	M	--do--	--do--	2	--do--	17 mos.
	22 mice	41	F	--do--	--do--	0	13 alive at 12 mos.	17 mos.
	2 mice	42	M	--do--	--do--	0	---	---
	3 mice	42	F	--do--	--do--	0	---	---
Dobrovolskaia-Zavadskaia and Adamova, 1938b	22 mice	R III	M	--do--	--do--	4	---	15 mos.
	63 mice	R III	F	--do--	--do--	16[6]	---	20 mos.
Dobrovolskaia-Zavadskaia and Rouyer, 1938	51 mice	XXX	M & F	In tube	S.C.	2 sarc.[7]	46 died neg.	2 years
Dobrovolskaia-Zavadskaia and Adamova, 1939	22 mice	R III	M	0.07 to 0.12 mc. in tube	S.C.	4 sarc.[8]	17 died neg.	Up to 21 mos.
	63 mice	--do--	F	--do--	S.C.	16[9]	9 died neg.	Up to 23 mos.
Dobrovolskaia-Zavadskaia, 1940	198 mice[10]	---	M & F	In tube	S.C.	0[11]	---	---
	60 mice[10,12]	---	M & F	In tube	S.C.	1 sarc.	---	---
	Mice[13]	---	F	In tube	S.C.	57 mamm. adenocarc.	---	---
Franseen, et al., 1941a	2 rats	Slonaker	---	Seeds (0.16 mc.)	Upper tibial epiphysis	0	---	---
Franseen, et al., 1941b	4 rats	---	---	Seeds (0.2 mc. and 1.2 mc.)	Pituitary	0	---	5 mos.

1. Of breast bone and of left coxo-femoral region, at nearly 5 years
2. 2 epitheliomas of biliary tract (at site); osteosarcoma of right knee; epithelioma; metastases to lungs
3. Osteogenic
4. Also 2 spontaneous mammary tumors
5. Osteogenic, at base of skull
6. Many tumors also at distance; metastases to lungs and viscera
7. One case of abdominal metastases; also 1 generalized lymphadenomatosis
8. Also 1 tumor of the caecum
9. At site. Also 36 mammary carcinomas (5 at site); 2 visceral sarcomas; 1 pulmonary carcinoma; metastases to lung and viscera
10. Non-cancerous strains
11. Mammary adenocarcinoma, 8.8% in males 5.7% in females
12. Infested with Sp. morsus muris
13. Cancerous strains

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
64.--RADON (Continued)								
Rajewsky, et al., 1943	36 mice	White	---	1.16x10 6 = 2.0x10-5 mc. per cc.	Inhalation	11[1]	---	60-453 days
65.--SILICON DIOXIDE								
Campbell, J.A., 1940	75 mice	Mixed	M & F	As dust in air, 30 hrs. weekly for 1 yr.	Inhalation	0[2]	39 alive at 400 days	900 days
Shimkin and Leiter, 1940	50 mice	A	M & F	1 mg. in saline	I.V.	0	---	6 mos.
Shear and Leiter, 1941b	20 mice	C57 black	M	10 plus 10 mg. suspended in saline	I.P.	0	19 alive at 1 year 10 alive at 15 mos.	15 mos.
Campbell, 1943	50-60 mice	---	M & F	As dust in air, 30 hrs. weekly	Inhalation	0[2]	---	At least 10 mos.
66.--SILVER								
Hanzlik and Presho, 1923a	2 pigeons	---	---	0.6 and 1.6 g. per kg., as granules of metal	Gizzard	0	---	88 days
67.--SILVER NITRATE								
Daels, 1923	Mice	---	---	Impregnated in thread	Thru skin	0	---	150 days
68.--SODIUM ACETATE								
Heyl, A., 1889	1 rabbit	---	---	0.1 gm./kg. per day, 2.3 g. total dose	S.C.	0	---	1 mo.
69.--SODIUM ARSENITE								
Burrows, et al., 1936	40 rats	Het.	---	0.0173% in olive oil, 1 cc. weekly	S.C. groin	1	28 alive at 4 mos.	106 weeks
70.--SODIUM AZIDE								
Fairhall et al., 1943	9 rats	White	---	26.7 mg. daily	P.O.	0	All died in 39 days	39 days
71.--SODIUM BICARBONATE								
Addis, T. et al., 1926	24 rats	---	M & F	4% in food	P.O.	0	---	330 days
Kirsner, J. B., 1941	9 dogs	---	---	5-60 g. daily	P.O. and I.V.	0	---	114-261 days
72.--SODIUM BISULFITE								
Fitzhugh, et al., 1946	Rats	Osborne-Mendel	M & F	0.5% to 2% in food[3]	P.O.	0	---	Ca. 2 years
73.--SODIUM CHLORIDE								
Michalowsky, 1928	Fowls	---	M	In aq. soln.	Testis	0	---	---

1. 10 adenomas and 1 adenocarcinoma of the lung
2. Of the lung in higher percentage than in controls
3. Different diets

Reference	Animal	Strain and type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
73.--SODIUM CHLORIDE (Continued)								
Burrows and Cook, 1936	20 mice	Het.	M	As normal saline. 0.5 cc. twice weekly	S.C.	0	---	8 weeks
Takizawa, N., 1940a	Mice	---	---	0.9% in water. 0.75 cc. daily or every other day	S.C.	0	---	At least 250 days
Tokoro, Y., 1940	At least 39 rats	---	---	5-25% soln. in water every 1-3 days	S.C.	2 sarc.	---	At least 326 days
74.--SODIUM FLUORIDE								
Arnold and McClure, 1941	24 rats	---	---	0.5 mg. (calc. as fluorine) in water every other day for 24 days and daily thereafter	S.C.	0	---	Ca. 98 days
75.--SODIUM HYDROXIDE								
Bogen and Loomis, 1935	Mice	---	---	10% soln. in water, twice weekly	Skin painting	0[1]	7 alive at 6 mos.	Over 1 year
Russel, H.K. et al., 1941	5 rats	Wistar	F	1 cc. of 0.005 N aq. soln. 3 times weekly	P.O.[2]	0	---	93 days
76.--SODIUM NITRITE								
Hueper and Landsberg, 1940	6 rats	---	---	0.2 to 0.5 g. daily in food	P.O.	0	4 died or killed in 4 weeks	18 weeks
Tarr and Carter, 1942	9 rats	---	M & F	0.2% in food	P.O.	0	---	127-168 days
	3 cats	---	M & F	--do--	P.O.	0	All alive at 15 weeks	15 weeks
77.--SODIUM OXALATE								
Mulinos et al., 1943	10 rats	---	M & F	1 or 2% aq. soln.	P.O.	0	---	108-216 days
	6 rabbits	---	---	1% in saline, 10-60 mg. per kg. body wt., daily	I.V.	0	---	37 days
78.--SODIUM SELENITE								
Miller, W.T. and Williams, K.T., 1940	3 horses	---	F; M, castr	24 to 116 p.p.m. in food	P.O.	0[3]	---	77 weeks
	1 mule	---	M, castr	17.3 to 34.0 p.p.m. in food	P.O.	0	---	6.5 mos.
79.--SODIUM SUCCINIMIDO AURATE								
Block, et al., 1944	3 rats	White	---	1 mg., 14 daily injections	I.M.	0	---	57 days
	--do--	--do--	---	--do--	--do--	9	---	85 days

1. 1 benign tumor obtained
2. By stomach tube
3. One with cirrhotic liver

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
80.--SODIUM SULFATE								
Suntzeff, et al., 1940	9 mice	A,D,C57 & AKA	M & F	10% aq. soln., 6 times weekly	S.C.	0	---	15.5 mos.
81.--SODIUM TUNGSTATE								
Kinard and Ault, 1945	4 rats	---	M & F	0.1795% in food[1]	P.O.	0	---	100 days
82.--STRONTIUM[2]								
Lisco et al., 1947	Rats, mice and rabbits	---	---	0.05 to 5.0 microcuries per gram	---	0[3]	---	Ca. 200 days
83.--SULFAMIC ACID								
Ambrose, 1945	25 rats	white	F	1 and 2% in food	P.O.	0	---	15 weeks
84.--THALLIUM[4]								
Buschke and Peiser, 1922	100 rats	---	---	---	P.O.	0	---	At least 12 weeks
Buschke and Peiser, 1923	100 rats	---	---	0.2 mg. daily	P.O.	Papillomas[5]	---	---
	Rats	---	---	in salve	Skin	0	---	---
85.--THORITE								
Shimkin and Leiter, 1940	50 mice	A	M & F	5 mg. in saline	I.V.	0	---	6 mos.
86.--THORIUM DIOXIDE[6]								
Huguenin et al., 1931	Rabbits	---	---	5 cc. repeated injections	I.V.	0[7]	---	9 mos.
Naegeli and Lauche, 1931	Rabbits	---	---	---	Inj.	0	---	At least 16 mos.
	Dogs	---	---	---	Inj.	0	---	--do--
Gerard, 1932	4 rabbits[8]	---	---	1.6 to 6.5 cc. total dose	I.V.	0	---	12 mos.
Harris and Friedrichs, 1932	53 rats	---	---	0.2 to 1 cc.	I.V. tail	0	2 died in 2 days	Over 5 mos.
Huguenin et al., 1932	4 rabbits	---	---	0.25 to 5 cc.	I.V.	0	---	29 days to 9 mos.
	5 rabbits	---	---	2 to 5 cc repeated injections	I.V.	0	---	At least 6 mos.
Larsin, 1952	Rabbits	---	---	1.5 to 10 cc. total dose	I.V.	0	7 alive at 9 mos.	14 mos.

1. Corresponding to 0.1% tungsten metal
2. Radioactive isotope 89-90; form not stated
3. Bone tumors. Latent period at least 200 days
4. Form not stated
5. Of the forestomach
6. Except as noted, a stabilized colloidal aqueous solution known as Thorotrast containing 19 to 25 percent thorium dioxide by weight was used
7. Hepatitis and cirrhosis of the liver observed
8. With galactosuria

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
86.--THORIUM DIOXIDE[1] (Continued)								
Naegeli and Lauche, 1932	1 dog	---	---	2 injections[2]	I.V.	0	---	2 years
Oberling and Guérin, 1933	5 rats	---	---	1 cc. twice weekly for 5 weeks	Abdominal cavity	0	4 died in 9 mos.	16 mos.
Naegeli and Lauche, 1933	1 dog	---	---	---[2]	I.V.	0	---	5 years
Ravenna, 1933	9 rabbits	---	---	1 to 5.8 cc. total dose	I.V.	0	---	35 to 160 days
Vajano, 1933	66 rabbits, 2 dogs	---	M & F	0.3 to 20 cc., single or repeated injections[3]	I.V.	0	---	up to 2 years
Pohle and Ritchie, 1934	Over 80 rabbits	---	---	0.25 to 1 cc. per kg. body weight	I.V., ear	0	31 alive at 100 days	493 days
Tramontan, 1934	30 rabbits	---	---	0.7 to 7.44 cc., single or repeated injections	I.V.	0	8 died in 67 days	21 mos.
Vajano, 1935	Rabbits	---	---	0.5 to 13 cc. per kg. body weight, 1 to 9 injections	I.V.	0	10 alive in 1 year	3 years
	Guinea pigs	---	---	2-5 cc. per kg. body wt., single injection	I.V.	0	4 alive at 1 year	16 mos.
Prussia, 1936	14 rats	white	---	0.1 to 0.3 cc. every 2 days, 30 injections	S.C.	5[4]	6 alive at 3 mos.	At least 4 mos.
Roussy et al., 1936a	20 rats	---	---	0.5 cc.	S.C.	7[5]	9 died early	At least 24 mos.
	20 rats[6]	---	---	0.5 cc., 10 injections	I.P.	10	---	---
	10 rats[7]	---	---	0.5 cc., 5 injections	I.P.	7[8]	---	---
	10 rats	---	---	0.125 cc.	I.V.[9]	2[10]	All alive at 1 year	At least 1 year
	10 mice	---	---	0.5 cc.	Abdominal wall	5[11]	All dead at 1 year	Less than 1 year
	14 mice	---	---	0.25 cc.	I.P.	---	---	---
	6 mice	---	---	0.1 cc.	I.V., tail	---	---	---
	5 fowls	---	---	0.5 cc., 15 injections	I.V.	0	4 alive at 1 year	4 years
	10 fowls	---	---	0.25 cc., 5 injections	I.M.	0	---	2 years
Roussy et al., 1936b	10 rats	---	---	0.5 cc., twice weekly, 5 injections	I.P.	2 sarc.	3 alive at 1 year	14 mos.
	10 rats	---	---	--do--	S.C.	3 sarc.	4 alive at 1 year	At least 1 year
	20 rats	---	---	0.5 cc., single injections	S.C.	2 sarc.[12]	12 alive at 1 year	17 mos.

1. Except as noted, a stabilized colloidal aqueous solution known as Thorotrast containing 19 to 25 percent thorium dioxide by weight was used
2. Thordiol, a preparation similar to Thorotrast, was used
3. With or without injections of Trypan Blue
4. First tumor in about 1 month
5. Arising between 14 and 24 months
6. Bearing Jensen sarcoma
7. Bearing Flexner-Jobling epithelioma
8. Arising between 14 and 24 months
9. Jugular vein
10. Epitheliomas of the Fallopian tube
11. 4 lung epitheliomas and 1 epithelioma of the buccal cavity
12. With 3 more sarcomas developing

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
86.--THORIUM DIOXIDE[1] (Continued)								
Roussy et al., 1936b	20 rats	---	---	0.5 cc., single injections	I.P.	3 sarc.	7 alive at 1 year	14 mos.
	20 rats	---	---	0.25 cc.	I.V.	0	10 alive at 1 year	1 year
	10 mice	---	---	0.5 cc.	S.C. abdomen	0[2]	---	12 mos.
	14 mice	---	---	0.25 cc.	I.P.	0[3]	---	12 mos.
	6 mice	---	---	0.25 cc.	I.V.	0	---	12 mos.
	5 fowls	---	---	0.5 cc., 5 injections	S.C.	0	4 alive at 1 year	---
	5 fowls	---	---	--do--	I.M.	0	---	---
	5 fowls	---	---	0.5 cc., twice weekly, 15 injections	I.V.	0	2 alive at 3.5 years	---
Seible, 1936	60 rats	---	---	0.3 cc., 2 injections	S.C.	14[4]	42 alive at 12 mos.	---
	60 mice	---	---	0.1 cc., 2 injections	S.C.	2[5]	---	14.5 mos.
Bogliolo, 1937	16 mice	---	---	0.1 cc., 15 to 30 injections	S.C.	1[6]	10 died in 1 mo.	313 days
Burrows, 1937a	1 rabbit	---	---	2 cc.	I.V., ear	0[7]	---	4.5 years
Miyamoto, 1937	Rats (?)	---	---	---	---	Sarc.	---	---
Bogliolo, 1938	10 rats	---	♀	0.2 cc. every 2 days, 30 injections	S.C.	8[8]	2 killed early	389 days
	10 rats	---	♀	--do--	S.C.	6[9]	4 alive at 382 days	382 days
Orr, et al., 1938	4 rabbits	---	---	1.1 to 4.4 cc. per kg. body weight	I.V.	0	1 killed early	33 mos.
	2 rabbits	---	---	8 and 20 cc., respectively	I.P.	0	---	1 year
	1 rabbit	---	---	20 cc.	intra-intestine	0	---	---
Seible, 1938	60 rats	---	---	0.3 cc., 2 injections	S.C.	25[10]	43 alive at 1 year	73 weeks
	60 mice	---	---	0.1 cc., 2 injections	S.C.	9[11]	34 alive at 1 year	At least 1 year
Foulds, 1939	20 guinea pigs	---	♀	0.2 to 0.3 cc., 4 injections	Nipple	4[12]	8 alive at 2 years 8 mos. 3 neg. alive at 3 years, 6 mos.	3 yrs. 6 mos.
Van Meruenne and Ten Thije, 1939	3 rabbits	---	---	22 to 30 cc. total dose per kg. body weight, repeated injections	I.V.	0	---	At least 6 mos.
	14 rabbits	---	---	1 to 18 cc. per kg. body weight, single injections	I.V., I.P., S.C. & I.M.	5 sarc.[13]	4 alive at 35 mos.	35 mos.

1. Except as noted, a stabilized colloidal aqueous solution known as Thorotrast containing 19 to 25 percent thorium dioxide by weight was used
2. 1 pulmonary
3. 3 carcinomas and 1 carcinoma of the jaw
4. First tumor at 11 months
5. First tumor at 9 months
6. Beginning of a spindle-cell sarcoma after 295 days
7. Lesions in liver and spleen described
8. Mostly spindle-cell sarcomas; 4 animals with metastases (to lymph nodes, lungs, liver, diaphragm, mesentery, kidney, pleura, and peritoneum)
9. Mostly spindle-cell sarcomas; also similar-appearing tumors in the 4 animals alive at 382 days
10. First tumor at 48 weeks, metastases to right axilla and glands
11. First tumor at 39 weeks. No metastases
12. 3 sarcomas, 1 carcinoma; first tumor in 2 years 8 months
13. Of the spleen; also one with pulmonary tumor; metastases to lungs, liver, and kidneys

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
d6.--THORIUM DIOXIDE[1] (Continued)								
Miyamoto, 1939	13 rats	white	---	0.5 cc. twice weekly, 5 injections	S.C.	7 sarc.[2]	7 died in 1 mo.	Over 321 days
	8 rats	---do---	---	---do---	I.P.	---do---	---do---	---do---
Natucci, 1939	6 rats	---	---	0.5 cc.				
	4 guinea pigs	---	---	0.5 cc.	I.T.	0	---	16 mos.
					I.T.	0	---	18 mos.
Natucci and Dall' Armi, 1939	10 rats	white	---	2 to 5.5 cc. during 45 days	S.C.	4 sarc.[3]	5 died neg. in 5.5 mos.	14 mos.
Punie and Ritchie, 1939	7 dogs	---	♀	1 cc. per kg. body weight	I.V.[4]	0	1 died early	806 days
Andervont and Shimkin, 1940	Mice	A	---	0.2 cc.				
	Mice	A	---	Up to 0.8 cc.	S.C.	Sarc.	---	---
					I.V.	0[5]	---	---
Vassiliadis, 1940	100 rats	---	---	Weekly injections	I.P.	0	High mortality	Over 1 year
Andervont and Shimkin, 1941	10 mice	C3H	♀	0.2 cc.	S.C.	1[6]	Killed at intervals	18 mos.
	10 mice	A	♀	---do---	S.C.	2[7]	---do---	---do---
	10 mice	A	♀	---do---	I.P.	0	---do---	9-12 mos.
	18 mice	A	♀	---do---	I.V.	0	---do---	18 mos.
	10 mice	A	♂	0.2 cc., weekly for 4 weeks	I.d.	0	---do---	---do---
	20 mice	A	♂	0.2 cc., weekly for 3 weeks	I.V.	0	---do---	---do---
Franssen, et al., 1941a	9 rats	Slonaker	---	Crystals[8]	Upper tibial epiphysis	0	---	---
	12 mice	A	---	Crystals[8]	---do---	0	11 alive at 1 year	Over 1 year
Franssen, et al., 1941b	10 mice	A	---	Pellet (100g)	Adrenal	0	---	---
Roussy and Mürin, 1941	16 rats	---	---	0.5-5 cc.	S.C.	11 sarc.[9]	16 alive at 1 year	Ca. 1 year
	38 rats	---	---	---do---	I.P.	25 sarc.	38 alive at 1 year	---do---
	10 rats	---	---	5 cc.	I.P.	10 sarc.	---	Killed at 9-13 mos.
	17 rats	---	---	2.5 cc.	I.P.	11 sarc.	---	Killed at 12-17 mos.
	10 rats	---	---	0.5 cc.	I.P.	4 sarc.	---	Killed at 14-24 mos.
	120 mice	---	---	1/4-1/2 cc.	S.C. or I.P.	4[5]	---	At least 1 year
	12 fowls	---	---	2.5 cc.	S.C.	0	---	---do---
	10 rats	---	---	0.1 cc.	I.V.	0	---	---do---
	6 mice	---	---	---do---	---do---	0	---	---do---
	5 fowls	---	---	7.5 cc.	---do---	0	---	---do---

1. Except as noted, a stabilized colloidal aqueous solution known as Thorotrast containing 19 to 25 percent thorium dioxide by weight was used
2. Appearing on average of 321 days
3. First tumor at 11 months
4. Great saphenous vein
5. Of the lung
6. Hemangioma
7. No pulmonary tumors above regular incidence
8. Thorotrast crystals produced by evaporation of thorotrast, readily soluble in tissue fluids
9. 4 with metastases

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
86.--THORIUM DIOXIDE[1] (Continued)								
Heiman, 1942	6 rats[2]	---	F	0.5 cc., 3 injections	Inj.	0	---	Until death
87.--TUNGSTEN								
Kinard and Auli, 1945	12 rats	---	M & F	As metal, 2-10% in food	P.O.	0	---	100 days
88.--TUNGSTIC OXIDE								
Kinard and Auli, 1945	4 rats	---	M & F	.1262% in food	P.O.	0	---	100 days
89.--URANINITE (PITCHBLENDE)								
Shimkin and Leiter, 1940	50 mice	A	M & F	4 or 5 mg. in saline	I.V.	0	3 alive out of 20 at 6 mos.[3]	6 mos.
90.--WATER								
Suntzeff and Babcock, 1940	7 mice	A,D,C57 AKA	M	0.5 cc., 6 times weekly	S.C.	0	---	16 mos.
91.--YTTRIUM[4]								
Lisco, et al., 1947	Rats, mice rabbits	---	---	1.0 to 6.0 microcuries	I.V. or S.C.	0[5]	---	Ca. 200 days
	33 rats	---	---	1.0 to 6.0 microcuries	P.O.[6]	0[7]	---	Ca. 506 days
	8 animals	---	---	0.40, 0.20, 0.06 mc. (total dose)	P.O.	0[8]	---	548 days
92.--YTTRIUM PHOSPHATE								
Lisco, et al., 1947	Mice	---	---	0.5 to 1.5 microcuries per gram	S.C. or I.M.	0[9]	---	Ca. 200 days
93.--ZINC								
Heller and Burke, 1927	4 rats	---	M & F	0.25% as metal dust in food	P.O.	0	---	---
94.--ZINC ACETATE								
Helpup, 1889	1 rabbit	---	---	0.08 g. per kg. daily (total dose)	S.C.	0	---	1 month
Fränkel and Klein, 1916	1 rabbit	---	---	In aqueous solution	S.C., ear	1[10]	---	---
Thompson et al., 1927	Rats	---	M & F	1.75-6.3 mg. (calc. as zinc) daily	P.O.	0	---	At least 29 weeks

1. Except as noted, a stabilized colloidal aqueous solution known as Thorotrast containing 19 to 25 percent thorium dioxide by weight was used
2. Other animals with spontaneous and transplanted mammary tumors and some also estrinized
3. High mortality from uranium nephritis
4. Radioactive isotope 91; form not stated
5. Sarcomas of the skeletal system
6. By stomach tube
7. 4 died with adenocarcinoma of the colon
8. 6 died with carcinoma of the colon
9. Local fibrosarcomas; also liver damage
10. Granulation tumor

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
95.--ZINC CARBONATE								
Heller and Burke, 1927	8 rats	---	M & F	0.25% (calc. as zinc) in food	P.O.	0	---	---
Sutton and Nelson, 1937	15 rats	---	M & F	0.1 to 1% in food	P.O.	0	---	39 weeks
96.--ZINC CHLORIDE								
Helpup, 1889	1 rabbit	---	---	1 cc. .05% soln. in milk 1 to 2 doses[1]	---	0	---	1 month
	4 cats	---	---	5 cc. 0.50% in milk	P.O.	0	---	5 mos.
Heller and Burke, 1927	13 rats	---	M & F	0.25 or 0.50% (calc. as zinc) in food	P.O.	0	---	---
Michalowsky, 1926	Fowls	---	M	5% aq. soln., 0.1 cc.	Testis	1[2]	---	4.5 mos.
Michalowsky, 1928	--do--	---	M	5% aq. soln., Ca. 0.4 cc.	--do--	Tumors[3]	---	---
Michalowsky, 1929	40 fowls	---	M	5 to 10% aq. soln.	--do--	--do--[4]	---	---
Ljvraga, 1934	Fowls	---	M	5 to 10% aq. soln. 0.04 to 0.50 cc., 1 to 3 injections	--dc--	3[5]	---	1.5 to 8 mos.
Bagg, 1936	20 fowls	---	M	5% aq. soln. 0.25 to 0.40 cc.	Testis	2	9 alive at 50 days	123 days
	11 fowls	---	M	--do--	Testis	0	All alive at 309 days	430 days
	26 fowls	---	M	--do--	--do--	2	---	Over 1 year
Kahlau, 1937	30 fowls	---	M	5% soln. 0.05-0.4 cc.[6]	Testis	0	25 alive at 6-8 mos.	6-8 mos.
Anissimova, 1939	19 fowls	---	M	5% aq. soln., 0.3 cc.	Testis	2[3]	16 alive at 3 mos.	3 mos.
Bischoff et al., 1940	15 mice	Marsh-Buffalo	F	0.05 mg. (calc. as zinc); repeated injection	Thymus	1[7]	---	15 mos.
Falin, 1940	Fowls	---	M	5% aq. soln.	Testis	6[3]	---	150 days
Falin, 1942	Fowls	---	M	5% soln.	--do--	Tumors[3]	---	51-92 days
97.--ZINC CITRATE								
Thompson, P.K. et al., 1927	Rats	---	M & F	9.7 or 10.2 mg. (calc. as zinc)	P.O.	0	---	At least 29 weeks
98.--ZINC LACTATE[8]								
Grimmett, 1937	3 pigs	---	---	0.1% (calc. as zinc) in milk[9]	P.O.	0	---	12 weeks
Sampson et al., 1942	5 pigs	Crossbred	---	100 g. daily in food for 3 mos.	P.O.	0	---	3 mos.

1. 0.01 g. zinc chlorate every other day
2. Teratoma
3. Teratomas
4. Teratomas in nearly all the animals
5. Granulomatous masses interpreted by the author as teratoma
6. Called "Zincum Chlorat," but work done to check work of Michalowsky
7. Lymphosarcoma of thymus; of 15 controls, all had spontaneous lymphosarcoma of thymus
8. Isomer not stated
9. Total dose calc. to be 181-237 g. as zinc

Reference	Animal	Strain or type	Sex	Prescription and dose	Site and route	Animals with tumors	Survival	Duration of experiment
98.--ZINC LACTATE[1] (Continued)								
Sampson et al., 1942	5 pigs[2]	---	---	17.5 g. per gal. of milk	P.O.	0	---	9.5 mos.
99.--ZINC d-LACTATE								
Fränkel and Klein, 1916	5 mice	---	---	0.5 to 1 mg. in water	S.C.	1[3]	---	---
	Rabbit	---	---	1% aq. soln., 1 cc.	S.C.	1[3]	---	---
	2 rabbits	---	---	--do--	S.C.	2[4]	---	---
	1 rabbit	---	---	--do--	I.V.	0	---	---
	1 rabbit	---	---	--do--	Testis	0	---	---
	2 rabbits	---	---	---	S.C.	1[3]	---	---
100.--ZINC dl-LACTATE								
Fränkel and Klein, 1916	5 mice	---	---	---	S.C.	0	---	---
	2 rabbits	---	---	---	S.C.	1[3]	---	---
101.--ZINC MALATE								
Thompson, P.K. et al., 1927	Rats	---	M & F	11.1 - 16.5 mg. (calc. as Zinc) daily	P.O.	0	---	At least 29 weeks
102.--ZINC NITRATE								
Fränkel and Klein, 1916	1 rabbit	---	---	In aqueous solution	S.C.	1[3]	---	---
Falin and Gromzeva, 1940a	45 fowls	---	M	10% aq. soln. 0.1 - 0.2 cc.	Testis	4[5]	6 died in 5 days	100 days
Falin and Gromzeva, 1940b	--do--	---	M	--do--	--do--	4[5]	--do--	--do--
103.--ZINC OXIDE								
Wibmer, 1889[6]	1 dog	---	---	10 - 15 grains daily	P.O.	0	---	6 weeks
Drinker, et al., 1927	10 cats	---	M & F	0.175 to 1 g. daily in food	P.O.	0[7]	---	Up to 53 weeks
	5 dogs	---	M & F	0.5 to 1 g. daily in food	P.O.	0	---	Up to 19 weeks
Heller and Burke, 1927	5 rats	---	M & F	0.5% (calc. as zinc) in food	P.O.	0	---	---
Thompson, P.K. et al., 1927	Rats	---	M	34.4 mg. in gum acacia susp. daily	P.O.	0	---	At least 29 weeks
104.--ZINC SULFATE								
Fränkel and Klein, 1916	1 rabbit	---	---	In aqueous soln.	S.C.	1[3]	---	Over 300 days

1. Isomer not stated
2. Weanlings
3. Granulation tumor
4. Granulation tumors
5. Teratoid tumors; first at 41 days
6. Quoted by A. Helpup, 1889
7. One with kidney tumors and 3 with nodules on pancreas

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
104.--ZINC SULFATE (Continued)								
Heller and Burke, 1927	4 rats	---	M & F	0.25% (calc. as zinc) in food	P.O.	0	---	---
Bischoff and Long, 1939	30 mice	Marsh-Buffalo	---	0.05 mg. (calc. as zinc) in water daily	Mammary gland	Tumors[1]	---	Over 21 mos.
	22 mice[2]	--do--	F	--do--	--do--	Tumors[3]	---	At least 16 mos.
Falin and Gromzewa, 1939a	29 fowls	---	M	10% aqueous soln. 0.15 to 0.20 cc.	Testis	3[4]	---	71 days
Falin and Gromzewa, 1939b	72 fowls	---	M	10% in water 0.15 to 0.30 cc., single injection	Testis	5[4]	---	At least 159 days
Falin, 1940	Fowls	---	M	10% aqueous solution	Testis	3[5]	---	84 days

1. Mammary tumors, first at 8 to 9 months, but fewer than in controls
2. Immature animals
3. Mammary tumors but fewer than in controls
4. Teratomas
5. Granulation tumor

B.--ORGANIC COMPOUNDS. I.--ALIPHATIC

105.--ACETALDEHYDE CH_3CHO

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Nakahara and Mori, 1939	Rats	---	---	In food	P.O.	0[1]	---	Over 300 days
Nakahara and Mori, 1940	--do--	---	---	--do--	--do--	0	---	At least 300 days

106.--ACETIC ACID CH_3COOH

Michalowski, 1928	Fowls	---	M	Soln. in water	Testis	0	---	---
Berenbium, 1935	Mice	---	---	In acetone, weekly, 3 applications	Skin	0	---	1 month
Orr, 1938	Mice	---	---	10% in acetone, weekly	Skin	0	---	---

107.--ACETONE CH_3COCH_3

Orr, 1938	10 mice	Stock	---	Weekly applications	Skin	0	---	23 weeks
Glücksmann, 1945	10 mice	Albino	M & F	5-6 drops weekly	Skin	0[2]	---	5 mos.
Burrows, et al., 1945	10 mice	MRC	M	Twice weekly for about 70 days	Skin	0	---	150 days

108.--ACETYLCHOLINE $CH_3COOCH_2CH_2N(CH_3)_3OH$

Heinlein, 1936	Rabbits	---	---	Treatment for rather long time	---	0	---	Rather long time
Hall and Franks, 1938	Dogs	---	---	Daily	I.V.	1 sarc.[3]	3 alive at 150 days	161 days
	Rats	---	---	--do--	S.C.	6[4]	20 alive at 6 mos.	11 mos.
	Guinea pigs	---	---	--do--	---	2[5,5]	6 alive at 4 mos.	---
	Fowls	---	---	---	---	1 sarc.[6]	7 alive at 8 months	---
	Mice	---	---	3 times weekly	---	2[7]	12 alive at 2 months	---

109.--ACROLEIN $CH_2{=}CH{-}CHO$

Steiner et al., 1943	15 mice	Partly-in-bred albinos	F	0.2 mg. in sesame oil, for 24 weeks, weekly	---	0	11 alive at 12 mos.	24 mos.

110.--AEROSOL OT

$$\begin{array}{l} COOC_8H_{17} \\ CH\text{-}SO_3Na \\ CH_2 \\ COOC_8H_{17} \end{array}$$

Lorenz et al., 1941	5 mice	A, and C_3H and A back-cross	---	0.1% in H_2O, 5 times weekly	I.P.	0	---	10 weeks

1. No significant pathological changes
2. No changes in skin observed
3. Osteogenic. Site not stated
4. Not at site
5. Osteogenic
6. Of tibia
7. Mesoblastic tumors

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
110.--AEROSOL OT $\begin{matrix}COOC_8H_{17}\\ CH\text{-}SO_3Na\\ CH_2\\ COOC_8H_{17}\end{matrix}$ **(Continued)**								
Lorenz et al., 1941	8 mice	--do--	---	0.1% in H_2O, 4 cc. daily	P.O.	0	---	Over 7 mos.
	Mice	A backcross	---	50 mg. pellets	S.C.	0	---	Over 4 weeks
	Mice	A	---	5% in H_2O; 0.2 cc.	S.C.	0	---	120 days
Benaglia et al., 1943	50 rats	Wistar	M & F	0.25-1.25 g. per kg. body wt., daily in food	P.O.	0	All alive at 24 weeks	24 weeks
	6 dogs	---	---	0.1 or 0.25 g. per kg. body wt., daily in food	--do--	0	--do--	--do--
	3 monkeys	Macacus rhesus	---	0.125 g. per kg. body wt., daily	--do--[1]	0	--do--	--do--
	7 rabbits	---	---	0.5 g. per kg. body wt., daily	--do--	0	2 died in 1 week	--do--
111.--ALLYL ISOTHIOCYANATE $CH_2=CHCH_2NCS$								
Soboleva, 1938	10 mice	White	---	3 times weekly	Skin	0	6 alive at 11 mos.	19 mos.
Visser and Ten Seldam, 1938	50 mice	---	---	1/320 normal in acetone, twice weekly	--do--	0	---	5 mos.
112.--ALLYL THIOUREA $CH_2=CHCH_2-NH-CS-NH_2$								
Kennedy, T.H., 1942	Rats	---	---	20 mg., daily	P.O.[1]	0	---	8 weeks
Bielschowsky, 1944b	10 rats	---	M & F	5 or 6 mg. daily in food for 30 weeks	P.O.	0[2]	---	286 days
Bielschowsky[3]	Rats	---	---	---	---	0	---	41 weeks
Wagner-Jauregg and Koch, J., 1947	10 rabbits	---	F	70-150 mg. per day[4]	S.C.	0	---	12-96 days
113.--AMYL ALCOHOL $C_5H_{11}OH$								
Nakahara and Mori, 1939	Rats	---	---	In food	P.O.	0[5]	---	Over 300 days
Nakahara and Mori, 1940	Rats	---	---	In food	---	0	---	At least 300 days
114.--BENZYL OLEATE $CH_3(CH_2)_7CH=CH(CH_2)_7COOCH_2C_6H_5$								
Hieger, 1950	20 mice	---	---	---	Skin painting	0	---	---
Kennaway and Hieger, 1950	Mice	---	---	---	Skin	0	---	---
115.--BUTYL ALCOHOL C_4H_9OH								
Nakahara and Mori, 1939	Rats	---	---	In food	P.O.	0[5]	---	Over 300 days
Nakahara and Mori, 1940	Rats	---	---	In food	P.O.	0	---	At least 300 days

1. By stomach tube
2. 9 animals with goitre
3. Cited by H. N. Green, 1944
4. One rabbit given 100 mg. daily P.O. for 35 days
5. No significant pathological changes

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
116.--n-BUTYRIC ACID $CH_3CH_2CH_2COOH$								
Twort and Fulton, 1930	Mice	---	---	25 and 50% in olive oil, 2 times weekly	---	---	---	---
117.--CALCIUM GLUCONATE $Ca[HOCH_2(CHOH)_4COO]_2.2H_2O$								
Silberberg, M. and Silberberg, A, 1943	28 mice	C_{57} and CBA	M	0.25 cc. of 10% solution, repeated injection	S.C.	0	---	At least 9 weeks
118.--CAPRIC ACID $CH_3(CH_2)_8COOH$								
Tsuhanani, 1926	2 rats	---	M	10% in food	P.O.	0	---	100 to 110 days
119.--CARBON TETRACHLORIDE CCl_4								
Bollman and [illegible], 1931	4 dogs	---	---	10 cc. daily for 3 mos.	P.O.	0[1]	2 died in 3 mos.	At least 2 years
Winter, 1938	6 dogs	---	---	1 to 4 cc. daily	P.O.	0	---	Up to 13 weeks
Forbes, J.C., 1939	Rats	---	---	Vapors, 20-30 min., 3 times weekly	Inhalation	0[2]	---	9-11 weeks
Tsubouti and Furukawa, 1939	Dogs	---	---	2 - 15 g. daily to weekly	P.O.	0[3]	---	1 mo. to 413 days
	Rabbits	---	---	0.1 to 0.5 g. daily to weekly	--do--	0[3]	---	1 mo. to 400 days
White, E.G., 1939	3 pigs	---	---	0.05-0.2 cc. per kg. body wt.; every 4 or 5 days	S.C.	0[3]	---	Ca. 200 days
Dapra and Silvani, 1940	3 rabbits	---	---	10% in ether, daily for 12 days	Skin painting	0[4]	---	12 days
	--do--	---	---	50% in ether, daily for 60 days	--do--	0[4]	---	60 days
	--do--	---	---	0.5% in ether, daily for 60 days	Inhalation	0[4]	---	--do--
Edwards, 1941	207 mice	C3H	M	40% in olive oil, 0.1 cc. 2-3 times weekly	P.O.[5]	126[6]	143 autopsied	8-16 weeks
	133 mice	A	M & F	--do--	--do--	54[6]	54 autopsied	--do--
Miller, J.A., et al., 1941	10 rats	Albino	---	0.1 cc. every 3 days for 112 days	S.C.	0	---	112 days
Edwards and Dalton, 1942a	143 mice	C3H	M	0.04 cc. in olive oil, 23-58 times	P.O.[5]	126[7]	---	Up to Ca. 7 mos.
	15 mice	Y	M & F	--do--	--do--	9[7]	---	--do--
	41 mice	C	F	--do--	--do--	34[7]	---	--do--
	64 mice	A	M & F	--do--	--do--	65[7]	---	--do--
	101 mice	A	F	0.005-0.04 cc. in olive oil, 1-3 times	--do--	0[7]	---	12 mos.
	58 mice	A	F	0.005 cc. in olive oil, 25-29 times	--do--	41[7]	---	4.5 mos.
Edwards et al., 1942	73 mice	L	M & F	0.04 cc. in olive oil, 3 times weekly for 4 mos.	P.O.[5]	34[8]	---	6.5 mos.

1. Cirrhosis of the liver obtained
2. Cirrhosis of liver retarded or prevented by subcutaneous injection of xanthine, sodium xanthine, or a crude liver preparation containing about 50% xanthine
3. Cirrhosis of the liver in all cases
4. Degeneration in liver and kidney
5. By stomach tube
6. Hepatomas; first at 23 doses
7. Hepatomas; no metastases
8. Hepatomas

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
119.--CARBON TETRACHLORIDE CCl_4 (Continued)								
Ennor, 1942	3 guinea pigs	---	M	0.15 cc. in olive oil, repeated injection	S.C.	0	---	74 days
Forbes et al., 1942	57 rats	---	---	Daily to 3 times weekly	Inhalation	0[1]	---	47-75 days
Post J. et al., 1942	130 rats	Sherman	M	0.025 cc. per 100 g. body wt., in mineral oil, 2 times weekly	S.C.	0[1]	---	11 weeks
Eschenbrenner, 1944	300 mice	A	M & F	1×10^{-6} to 16×10^{-4} cc (per g. body wt.) in olive oil, 30 times at intervals	P.O.[2]	156[3]	---	150 days
Eschenbrenner and Miller, 1946	90 mice	A	M & F	1/8-32% in olive oil for 116-119 days	P.O.[2]	Some[3]	---	At least 149 days
Drill and Loomis, 1947	6 dogs	Mongrel	---	0.3 cc. per kg. body wt.[4] for 5 days	P.O.	0[5]	---	At least 16 weeks
	--do--	--do--	---	0.25 cc. per kg. body wt.[4] for 5 days	--do--	--do--	---	--do--
	5 dogs	--do--	---	0.125 cc. per kg. body wt.[4] for 5 days	--do--	--do--	---	--do--
	8 dogs	--do--	---	0.125 cc. two times per week[4]	--do--	--do--	---	--do--
	6 dogs	--do--	---	0.125 cc. daily for 5 days	--do--	--do--	---	--do--
Morrione, 1947	56 rats	Albino	M	Vapors for 20 minutes 3-4 times per week	Inhalation	0[6]	---	At least 3-1/4 mos.
120.--CARBON DISULFIDE CS_2								
Ferraro et al., 1941	5 cats	---	---	8 - 10 mg. per liter of air	Inhalation	0	---	24-92 days
121.--CEPHALIN $CH_2\text{-}O\text{-}COR_1$, $CH\text{-}O\text{-}COR_2$, $CH_2\text{-}O\text{-}P(O)(OH)\text{-}O\text{-}CH_2.CH_2NH_2$[10]								
Takahashi, 1926	2 rats	White	M & F	0.7% in food	P.O.	0	---	70-90 days
122.--CHLORACETONE CH_3COCH_2Cl								
Crabtree, H.G., 1940b	Mice	Stock	---	0.3% in ether plus 2% liq. paraffin, 3 times weekly	Skin	0	---	6 mos.
123.--CHLORAL HYDRATE $CCl_3CH(OH)_2$								
Larsen and Heston, 1945	Mice	A & C	M & F	---	I.P.	0[7]	---	6 mos.
124.--CHLORALOSE[8] $C_8H_{11}O_6Cl_3$								
Orr, 1947a	60 mice	Stock	---	0.7% m. 25 ml., weekly intervals for 18 weeks	I.P.	0[9]	---	Ca. 185 days

1. Cirrhosis of the liver obtained
2. By stomach tube
3. Hepatomas
4. With methionine added intravenously
5. Some liver damage
6. Cirrhosis
7. Of the lung
8. Isomer not given
9. Pleural nodules, possibly adenoma in 5 mice
10. R_1 and R_2 are fatty acid residues.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
125.--CHLOROFORM $CHCl_3$								
Iwata and Irrni, 1940a	11 rabbits	---	---	0.08 to 0.02 cc. per kg. body wt. in paraffin oil, mostly weekly injections	S.C.	0[1]	---	Up to 13 mos.
Eschenbrenner and Miller, 1945	50 mice	A	M & F	1 x 10^{-6} to 16 x 10^{-6} cc. in olive oil every 4 days, 30 times	P.O.[2]	7[3]	---	3 mos.
126.--l-CYSTINE $(-S-CH_2CHNH_2COOH)_2$								
Shear and Stewart, 1941[4]	7 mice 14 mice 12 mice	dba Stock A	M M & F F	Ca. 5 mg. crystals, repeated injections (110 mg., total dose)	S.C.	0	---	22 mos.
127.--β,β'--DIBROMODIETHYL SULFIDE $(BrCH_2CH_2)_2S$								
Berenblum, 1935	Mice	---	---	In acetone, weekly, 3 applications	Skin	0	---	1 mo.
128.--β,β'--DIBROMODIETHYL SULFONE $(BrCH_2CH_2)_2SO_2$								
Berenblum, 1935	Mice	---	---	In acetone, weekly, 3 applications	Skin	0	---	1 mo.
129.--β,β'--DICHLORODIETHYL ETHER $(ClCH_2CH_2)_2O$								
Berenblum, 1935	Mice	---	---	In acetone, weekly, 3 applications	Skin	0	---	1 mo.
130.--β,β'--DICHLORODIETHYL SULFIDE $(ClCH_2CH_2)_2S$								
Berenblum, 1935	Mice	---	---	In acetone, weekly, 3 applications	Skin	0	---	1 mo.
Orr, 1938	Mice	---	---	0.1% in benzene, weekly; 0.01% in acetone, weekly; 0.06 and 0.03% in liquid paraffin, weekly	--do--	0	---	At least 28 weeks
Lisser and Ten Seldam, 1938	50 mice	---	---	1/320 normal[5] in acetone, twice weekly	Skin	0	---	5 mos.
131.--β,β'--DICHLORODIETHYL SULFONE $(ClCH_2CH_2)_2SO_2$								
Berenblum, 1935	Mice	---	---	In acetone, weekly, 3 applications	Skin	0	---	1 mo.
132.--β,β'--DICHLORODIETHYL SULFOXIDE $(ClCH_2CH_2)_2SO$								
Berenblum, 1935	Mice	---	---	In acetone, weekly, 3 applications	Skin	0	---	1 mo.
133.--DICHLOROMETHANE CH_2Cl_2								
Heppel et al., 1944	Animals[6]	---	M & F	17 mg./l(5000 p.p.m.) 7 hour exposure 5 days a week	Inhalation	0	---	At least 6 mos.
	--do--	---	--do--	54 mg./l(10,000 p.p.m.) 5 days week, 4 hour exposure	---	---	---	7-1/2 weeks

1. Liver cirrhosis obtained
2. By stomach tube
3. Hepatomas in 8 x 10^{-6} and 4 x 10^{-6} doses only (20 mice)
4. Preliminary results in Shear and Stewart 1941
5. Relatively pure substance used
6. Dogs, rabbits, guinea pigs, rats

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
134.--1,2-DICHLOROPROPANE $CH_3CHClCH_2Cl$								
Heppel et al., 1946	Animals[1]	---	---	1000 p.p.m.-2, 0 p.p.m. 7 hours daily, 5 days a week	Inhalation	0	---	At least 6 mos.
135.--DIETHYLENE GLYCOL $HOCH_2CH_2OCH_2CH_2OH$								
Haag and Ambrose, 1937	30 rats	White	---	0.05% to 1%[2] in water	P.O.	0	6 died in 42 days	100 days
Morck, 1957	6 rats	---	---	20% in food[3]	P.O.	0	5 died in 4 weeks	At least 6 weeks
	5 rats	---	---	10% in food[3]	P.O.	0	3 dies in 8 weeks	At least 8 weeks
	6 rats	---	---	5% in food[3]	P.O.	0	1 died in 7 weeks	At least 10 weeks
	5 rats	---	---	0.125 to 4% in water[4]	P.O.	0	3 died in 9 days	9 weeks
Kesten et al., 1957	107 rats	---	---	0.5 to 5% in water	P.O.	0	14 died in 56 days	19-174 days
	26 rabbits	---	---	1 or 2 cc. per kg. body wt., single inj.	I.V.	0	8 died in 8 days	1-44 days
Kesten et al., 1959	17 rats	---	---	0.5% in water	P.O.	0	---	22-124 days
	30 rats	---	---	1% in water	P.O.	0	---	33-217 days
	30 rats	---	---	5% in water	P.O.	0	21 died in 56 days	4-99 days
	42 rats	---	---	9% in water	P.O.	0	9 died in 6 days	1-56 days
Weatherby and Williams, 1959	3 dogs	Mongrel	F	10% in water 17.5 cc. per kg. body wt., daily	P.O.	0	All died	13 days
	5 rats	Wistar	M	2.5 cc. 5 times, daily	P.O.	0	2 died in 20 days	45 days
	5 rats	--do--	M	7.5 cc. daily	P.O.	0	2 died in 16 days	60 days
	Rats	--do--	M & F	0.5% and 1.0% in water	P.O.	0	---	175 days
Morris et al., 1942	20 rats	Inbred	M & F	1.71% and 3.42% in food	P.O.	0	---	2 years
Fitzhugh and Nelson, 1946a	Rats	Osb.- Mend.	M	1% in food	P.O.	0	---	2 years
	Rats	--do--	M	2% in food	P.O.	6[5]	---	--do--
	Rats	--do--	M	4% in food	P.O.	6[5]	---	2 years
Hanzlik et al., 1947	Rats	---	M & F	1% in drinking water	P.O.	0	Most died after 12 weeks	12 weeks
	Mice		M & F		P.O.	0	---	24 weeks
136.--DIETHYLENE GLYCOL MONOBUTYL ETHER $HOCH_2CH_2OCH_2CH_2OC_4H_9$								
Kesten et al., 1959	9 rats	---	---	5-5% in water	P.O.	0	---	5-35 days

1. Dogs, rabbits, mice, guinea pigs, & rats
2. Higher concentrations caused high mortality
3. Commercial grade
4. Purified grades
5. Bladder tumors

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
137.--DIETHYLENE GLYCOL MONOETHYL ETHER $NOCH_2CH_2OCH_2CH_2OC_2H_5$								
Morris et al., 1942	20 rats	Inbred	M & F	2.16% in food	P.O.	0	---	2 years
Hanzlik et al., 1947	10 rats	---	M & F	1% in drinking water and synthetic diet	P.O.	0	Most died after 12 weeks	12 weeks
	Mice	---	M & F	40-65g. per kg. in food	P.O.	0	---	24 weeks
138.--DIETHYLENE GLYCOL MONOMETHYL ETHER $NOCH_2CH_2OCH_2CH_2OCH_3$								
Kesten et al., 1939	9 rats	---	---	3-5% in water	P.O.	0	---	11-64 days
139.--β,β'--DIIODODIETHYL SULFONE $(ICH_2CH_2)_2SO_2$								
Berenblum, 1935	Mice	---	---	In acetone weekly, 3 applications	Skin	0	---	1 mo.
140.--DI-ISOPROPYL FLUOROPHOSPHATE $POF[(CH_3)_2CHO]_2$								
Koelle and Gilman, 1946	2 dogs	---	---	0.30 and 0.50 mg. per kg. body wt., in peanut oil, thrice weekly for 12 weeks	I.M.	0	---	17 and 23 weeks
	4 dogs	---	F	0.05-0.30 mg. per kg. body wt., in peanut oil, twice weekly for 6 mos.	I.M.	0	---	203 days
	4 monkeys	Rhesus	---	0.03 and 0.05 mg. per kg. body wt., in peanut oil, twice weekly for 4 mos.	I.M.	0	---	4 mos.
	36 rats	---	M & F	0.1-0.5 mg. per kg. body wt., in peanut oil, twice weekly for 26 weeks	I.M.	0	---	26 weeks
141.--DIPROPYLENE GLYCOL $CH_3CHOHCH_2OCH_2CHOHCH_3$								
Kesten et al., 1939	7 rats	---	---	1-5% in water	P.O.	0	---	33-77 days
	25 rats	---	---	10% in water	P.O.	0	7 died in 30 days	9-68 days
142.--DOLOPHINE $CH_3CH[N(CH_3)_2]CH_2C(C_6H_5)_2COCH_2CH_3 \cdot HCl$								
Scott et al., 1947	4 dogs	---	---	5 mg./kg. once daily for the first 4 days, twice daily, thereafter	I.P.	0	2 alive at end of exper.	Ca. 35 days
	6 dogs	---	---	1-5 mg./kg. repeated inj.	S.C.	0	---	Ca. 8 weeks
143.--ERYTHRITOL TETRANITRATE $O_2NOCH_2-(CHONO_2)_2-CH_2ONO_2$								
Donahue and Monaco, 1944	45 rats	Albino	M & F	2 mg. per kg. body wt., daily in food	P.O.	0	Low mortality	1 year
Hueper, and Landsberg, 1940	30 rats	---	M	0.35 to 64 mg. daily, in food	P.O.	0	16 alive at 32 weeks	32 weeks
	12 rats	---	F	14 or 28 mg. in saline suspension, 5 times weekly for 20 weeks	S.C.	0	10 alive at 20 weeks	20 weeks
144.--ETHER $(C_2H_5)_2O$								
Haga, 1913	1 rabbit	---	---	Daily	Skin painting, ear	0	---	31 days
White, L., and Wider, 1941	Mice	dba	---	Every 2 days	Skin painting	0	---	At least 100 days

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
145.--ETHYL ACETATE $CH_3COOC_2H_5$								
Nakahara and Mori, 1940	Rats	---	---	In food	P.O.	0	---	At least 500 days
146.--ETHYL ALCOHOL C_2H_5OH								
Haga, 1913	1 rabbit	---	---	Daily	Skin painting, ear	0	---	51 days
Krebs, 1928	16 mice	White	---	50% aqueous soln. 0.1 cc. every 2 days	Rectum	1 carc.[1]	---	547 days
	60 mice	---	W & F	---do---	P.O.	2 carc.[2]	---	554 days
Nakahara and Mori, 1939	Rats	---	---	In food	P.O.	0[3]	---	Over 500 days
Mackidor and Donnelly, 1932	25 dogs	---	---	40% aq. soln., 10 cc. per kg. body wt., daily	P.O.	0	---	6 mos. to 2 years and 2 mos.
Connor, 1940	66 rabbits	---	---	20% in water 20-100 cc. daily[4]	P.O.[5]	0	15 died of infection	504 days
Nakahara and Mori, 1940	Rats	---	---	In food	P.O.	0	---	At least 500 days
Russell, M.K. et al., 1941	5 rats	Wistar	F	1 cc. of 40% aq. soln., 3 times weekly	P.O.[6]	0	---	41 days
Baumann et al., 1942	15 rats	---	---	15% in water	P.O.	0	---	Up to 14 weeks
Larsen and Heston, 1945	Mice	A & C	W & F	---	I.P.	0	---	6 mos.
147.--ETHYL CARBAMATE $NH_2COOC_2H_5$								
Nettleship et al., 1943	50 mice	C3H	F	2% mg. in aq. soln., weekly, 14 times[6,7]	I.P.	38[8]	45 alive at 7-1/2 mos.	7-1/2 mos.
	---do---	---do---	F	2% mg. in aq. soln., weekly, 1-16 weeks	---do---	17[8]	killed at 1-16 weeks	5 mos.
	60 mice	---do---	F	---do---	---do---	Tumors[9]	Many killed early	---do---
	10 mice	A	---	2% mg. in aq. soln., weekly, 14 times	---do---	8[8]	8 alive at 4-1/2 mos.	4-1/2 mos.
	10 mice	C3H	---	7 mg. in aq. soln., 3 times weekly for 14 weeks	I.P.	4[8]	8 alive at 4-1/2 mos.	4-1/2 mos.
Hanahoe and Mayer, 1944	100 mice	A	---	1 g. per kg. body wt., in water, weekly 1-5 times	P.O.	93[10]	6 died within 4-1/2 mos.	4-1/2 mos.
Larsen and Heston, 1945	Mice	A & C	W & F	---	I.P.	Tumors[11]	---	6 mos.

1. Metastases to liver and lymph nodes. 2 lung adenomas. 1 sarcoma in left flank
2. Of back
3. No significant pathological changes
4. Two diets used
5. By stomach tube
6. Some animals received also X-rays
7. Minimal anesthetizing dose
8. Adenomas of the lung
9. Of the lung, adenomas; first within 2-3 mos.
10. Of the lung
11. One adenocarcinoma of small bronchus, one malignant blastoma of the lung, and 10 adenocarcinomas of the lungs

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
147.--ETHYL CARBAMATE $NH_2COOC_2H_5$ (Continued)								
Hirschbaum and Bell, 1947	21 mice	Sw	---	1 mg./gr. in water once each week	S.C.	0	---	6 mos.
Cloon, 1947	30 mice	CBA, A III, C57	M & F	0.25 cc. 10% weekly for 16 weeks	I.P.	0	---	7-10 mos.
Orr, 1947a	100 mice ---do---	Inbred ---do---	--- ---	12% 0.2% ml. weekly for 18 weeks ---do---	I.P. ---do---	1[2] ---do---	--- ---	Ca. 185 days ---do---
Orr, 1947b	65 mice	Stock	---	---	---	18[2]	---	---
148.--ETHYLENE-bis-CHLORDETHYL SULFIDE $(-CH_2-S-CH_2CH_2Cl)_2$								
Berenblum, 1941	Mice	---	---	In acetone weekly, 5 applications	Skin	0	---	1 mo.
149.--ETHYLENE GLYCOL $HOCH_2CH_2OH$								
Hanzlik et al., 1930	9 rats 10 rats	White White	--- ---	0.05 cc. daily for 40 days 1% and 0.5% in aq. soln.[3]	I.M. P.O.	0 0	--- ---	45 days 120-150 days
Wiley et al., 1936	20 mice	---	---	Avg. of 0.4 mg. per liter in air	Inhalation	0	17 alive at 16 weeks	16 weeks
	10 rats	---	---	---do---	---do---	0	9 alive at 16 weeks	16 weeks
Reston et al., 1939	11 rabbits 30 rats	---	---	1 to 4 cc. per kg. body wt. single dose 1 to 5% in water	I.V. P.O.	0 0	--- ---	1-120 days 6-73 days
Mauro, 1939	4 rabbits	---	---	50% in water, 1.5 cc. per kg. body wt., every other day	S.C.	0	All died in 150 days	150 days
	4 rabbits	---	---	50% in water, 2 cc. per kg. body wt., every other day	P.O.	0	---	Nearly 4 mos.
Chiray et al., 1941	4 rats 6 rats 8 rats	White ---do--- ---do---	--- --- ---	0.62 percent in drinking water 1.24 percent in drinking water 0.93 percent in drinking water	P.O. ---do--- ---do---	0 0 0	--- --- ---	4-9 mos. 4 weeks-6 mos. 5 weeks-6-1/2 mos.
	6 rats	---do---	---	1.24 g/100 N/5 in drinking water	---do---	0	---	3-6 weeks
Morris et al., 1942	20 rats	Inbred	M & F	1% and 2% in food	P.O.	0	---	2 years
Mullinos et al., 1943	26 rats	---	M & F	1% aq. soln., ca. 25-30 cc. daily	P.O.	0	All died at 79 days	8-79 days
	21 rats[4]	---	---	1% aq. soln.	P.O.	0	11 alive at 77 days	77 days
	13 rats	---	M	1-3% aq. soln.	P.O.	0	5 died in 61 days	257 days
Hanzlik et al., 1947	Rats	---	M & F	1% in drinking water	P.O.	0	Most died after 12 weeks	12 weeks
	Mice	---	M & F	5.4 and 6.5 g./kg. in food	P.O.	0	---	24 weeks
150.--ETHYLENE GLYCOL DIACETATE $CH_3COOCH_2CH_2OCOCH_3$								
Reston et al., 1939	11 rats	---	---	1-5% in water	P.O.	0	---	7-150 days

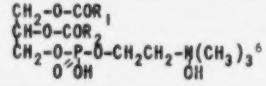
1. Lung tumors (adenomas). Greatest incidence in A III
2. Adenomas of the lung
3. Higher concentrations caused higher mortality
4. Very young

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
150.--ETHYLENE GLYCOL DIACETATE $CH_3COOCH_2CH_2OCOCH_3$ (Continued)								
Wutinic et al., 1965	10 rats	---	F	58 eq. soln.	P.O.	0	All dies at 57 days	57 days
	5 rats	---	M	1-38 eq. soln.	P.O.	0	All alive at 151 days	151 days
151.--ETHYLENE GLYCOL MONO-n-BUTYL ETHER $HOCH_2CH_2O(CH_2)_3CH_3$								
Werner et al., 1963a	66 rats	Wistar	M & F	0.46 and 1.56 mg. per liter in air, 7 hours daily, 5 days per week for 5 weeks	inhalation	0	---	6 weeks
Werner et al., 1963b	2 dogs	---	---	615 p.p.m. in air, 7 hours daily, 5 days a week for 12 weeks	---do---	0	---	17 weeks
152.--ETHYLENE GLYCOL MONOETHYL ETHER $HOCH_2CH_2OC_2H_5$								
Morris et al., 1962	20 rats	Ingred	M & F	1,450 in food	P.O.	0	---	2 years
Werner et al., 1963a	23 rats	Wistar	M & F	1.37 mg. per liter in air, 7 hours, daily 5 days a week for 5 weeks	inhalation	0	---	6 weeks
Werner et al., 1963b	2 dogs	---	---	840 p.p.m. in air, 7 hours daily, 5 days a week for 12 weeks	inhalation	0	---	17 weeks
153.--ETHYLENE GLYCOL MONOMETHYL ETHER $HOCH_2CH_2OCH_3$								
Werner et al., 1963a	23 rats	Wistar	M & F	0.97 mg. per liter in air, 7 hours daily, 5 days a week for 5 weeks	---do---	0	---	6 weeks
Werner et al., 1963b	2 dogs	---	---	750 p.p.m. in air, 7 hours, daily for 12 weeks, 5 days a week	inhalation	0	---	19 weeks
154.--ETHYLENE GLYCOL MONOISOPROPYL ETHER $HOCH_2CH_2OCH(CH_3)_2$								
Werner et al., 1963a	23 rats	Wistar	M & F	1.65 mg. per liter in air, 7 hours daily, 5 days a week for 5 weeks	inhalation	0	---	6 weeks
155.--ETHYLENE GLYCOL MONO-n-PROPYL ETHER $HOCH_2CH_2OCH_2CH_2CH_3$								
Werner et al., 1963a	23 rats	Wistar	M & F	1.36 mg. per liter in air, 7 hours daily, 5 days a week for 5 weeks	inhalation	0	---	6 weeks
156.--ETHYL PALMITATE $CH_3(CH_2)_{14}COOC_2H_5$								
Evans, H.M. and Lepkovsky, 1952	12 rats	---	---	22.7% in food	P.O.	0	---	Up to 100 days
157.--ETHYL STEARATE $CH_3(CH_2)_{16}COOC_2H_5$								
Evans, H.M. and Lepkovsky, 1952	12 rats	---	---	22.7% in food	P.O.	0	---	Up to 100 days
158.--FORMALDEHYDE HCHO								
Gerschin and Schaaad, 1956	35 rabbits	---	---	10% formalin, 0.1 cc. to 1 cc.	In lung	0[1]	---	6 mos.

1. Atypical proliferation

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
158.--FORMALDEHYDE HCHO (Continued)								
Garschin, 1937	23 rabbits	---	---	Suspension of formalin in sunflower seed oil	S.C., ear	0	---	16 to 32 days
	8 rabbits	---	---	--do--	Under the serosa	0	---	9 to 25 days
	9 rabbits	---	---	--do--	In lung	0	---	--do--
Orr, 1938	Mice	---	---	8% in acetone, weekly	Skin	0	---	---
Kienitzky, 1939	60 mice	---	F	In vegetable oil, every 2 days, 50 applications	Vagina	0	18 alive at 6 mos.	13.5 mos.
Kienitzky, 1940a	60 mice	---	F	In vegetable oil; in cotton plug every 2 days	Cervix of uterus	0	---	14 mos.
159.--FUMARIC ACID $\begin{matrix}CH\text{-}COOH \\ \| \\ HOOC\text{-}CH\end{matrix}$								
Levey et al., 1946	170 rats	Yale	---	1-10 grams[1]	P.O.	0	--	At least 2 years
160.--GLYCEROL $CH_2OHCHOHCH_2OH$								
Johnson, V. et al., 1933	51 rats	---	---	21%, 41% and 61% in food	P.O.	0	---	40 weeks
	10 rats	---	---	55% in food	P.O.	0	---	23 weeks
	3 dogs	---	---	35% in food	P.O.	0	---	50 weeks
Haag and Ambrose, 1937	5 rats	White	---	10% in water	P.O.	0	1 died in 41 days	100 days
Holck, 1937	Rats	---	F	20% in food	P.O.	0	---	11 weeks
Nakahara and Mori, 1939	Rats	---	---	In food	P.O.	0[2]	---	Over 300 days
Nakahara and Mori, 1940	Rats	---	---	In food	P.O.	0	---	At least 300 days
Suntzeff et al., 1940	7 mice	A,D,C57, & AKA	M	25% (by vol.) in water 6 times weekly	S.C.	0	---	16 mos.
161.--IODOACETIC ACID ICH_2COOH								
Berenblum, 1935	Mice	---	---	In acetone, weekly, 3 applications	Skin	0	---	1 mo.
Orr, 1938	--do--	---	---	2% in benzene, weekly	--do--	0	---	---
162.--ISO-AMYL CARBAMATE $NH_2\text{-}COOCH_2CH_2CH(CH_3)_2$								
Larsen and Heston, 1945	Mice	A & C	M & F	---	I.P.	0[3]	---	6 mos.
163.--LACTIC ACID $CH_3CHOHCOOH$								
Petroff and Krotkina, 1928	9 rats	---	---	1:15,000 to 1:1,000 in water[4]	Right buttock	1[5]	---	7 mos. to a year

1. 0.1-1.0% level. Sodium fumarate also used with same results
2. No significant pathological changes
3. Of the lung
4. Plus embryonic pulp
5. Other 8 rats developed tumors which receded completely

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
163.--LACTIC ACID $CH_3CHOHCOOH$ (Continued)								
Twort and Fulton, 1930	Mice	---	---	Twice weekly	Skin	0	---	25 weeks
164.--LAURIC ACID $CH_3(CH_2)_{10}COOH$								
Takahashi, 1926	9 rats	---	M	10% in food	P.O.	0	---	105-150 days
165.--LAURYL DIETHYLENETRIAMINE $R\text{-}NHCH_2CH_2NHCH_2CH_2NH_2$[1]								
Deichmann et al., 1940	Rats	---	---	1.5-5 cc. per kg. body wt.	S.C.	0	30% dead	4-6 weeks
	10 guinea pigs	---	---	1.5-5 cc. per kg. body wt., single application	Skin	0	---	6 mos.
	10 guinea pigs	---	---	0.2 cc. per kg. body wt., 6 times weekly	Skin	0	1 died early	7 weeks
166.--LECITHIN 								
Robertson, 1916b	96 mice	---	M & F	Ca. 83 mg. in food, daily	P.O.	2[2]	---	Ca. 56 weeks
Takahashi, 1926	2 rats	White	M & F	0.7% in food	P.O.	0	--	130 and 180 days
Tomkins, 1943	6 rabbits	---	F	0.01-1.0 g. in aq. emulsion with dextrose soln., daily	I.V., ear	0	---	5-74 days
167.--MALEIC ACID, SODIUM SALT								
Burrows and Cook, 1936	10 mice	Het.	M	0.033% aq. soln., 0.5 cc. twice weekly	I.P.	0	---	16.5 mos.
168.--MANNITOL $C_6H_8(OH)_6$								
Ellis and Krantz, 1941	20 rats	---	M	5% in food	P.O.	0	---	3 mos.
	6 monkeys	Macacus rhesus	---	3 g. in food, daily	P.O.[3]	0	---	3 mos.
169.--MANNITOL HEXANITRATE $C_6H_8(ONO_2)_6$								
Heppel, 1941	12 rats	---	F	11 mg. per day in food	P.O.	0	---	24 weeks
	6 rats	---	M	8.5 mg. per day in corn oil	P.O.	0[4]	---	24 weeks
170.--METHYL ALCOHOL CH_3OH								
Nakahara and Mori, 1939	Rats	---	---	In food	P.O.	0[5]	---	Over 300 days
Nakahara and Mori, 1940	Rats	---	---	In food	P.O.	0	---	At least 300 days

1. R is a mixture of even-numbered n-alkyl groups, chiefly lauryl
2. "Cancers" in males; site not given; also cancer in one female
3. By stomach tube
4. All organs normal grossly and microscopically
5. No significant pathological changes
6. R_1 and R_2 are fatty acid residues

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
170.--METHYL ALCOHOL CH_3OH (Continued)								
Sayers et al., 1944	2 dogs	---	---	1% in air for 3 minutes, 8 times daily	Inhalation	0	---	100 days
171.--METHYL-bis(β-CHLOROETHYLAMINE) $CH_3-N(CH_2CH_2Cl)_2$								
Spurr, 1947	16 rabbits	---	---	1-2 mg. every 4 days	S.C.	0	---	At least 13 weeks
172.--METHYL ETHYL KETONE $CH_3COC_2H_5$								
Nakahara and Mori, 1939	Rats	---	---	In food	P.O.	0[1]	---	Over 300 days
Nakahara and Mori, 1940	Rats	---	---	In food	P.O.	0	---	At least 300 days
173.--MYRISTIC ACID $CH_3(CH_2)_{12}COOH$								
Takahashi, 1926	6 rats	---	M & F	10% in food	P.O.	0	---	75-140 days
Burrows et al., 1936	10 mice	---	---	5% in olive oil, 0.2 to 0.5 cc.	S.C., breast	0	3 alive at 4 mos.	179 days
Burrows and Boyland, 1938	1 rabbit	---	F	5% in olive oil; repeated inj.	Mammary ducts	0	---	17-19 days
174.--OLEIC ACID $CH_3(CH_2)_7CH=CH(CH_2)_7COOH$								
White, C.P., 1909	Rabbits	---	---	Alone or in aqueous suspension	S.C.	0[2]	---	---
White, C.P., 1910	7 rabbits	---	---	Alone or in saline suspension	S.C., ear[3]	0[2]	---	---
	1 guinea pig	---	---	--do--	S.C., mammary gland	--do--	---	---
	2 mice	---	---	--do--	S.C., back	--do--	---	---
Takahashi, 1926	9 rats	---	M & F	10% in food	P.O.	0	---	65-140 days
Hieger, 1930	Mice	---	---	Redistilled grade	Skin painting	0	---	---
Kennaway and Hieger, 1930	Mice	---	---	Commercial grade	Skin	0	---	---
Twort and Fulton, 1930	100 mice	---	---	Twice weekly	Skin painting	0	---	40 weeks
	200 mice	---	---	---	---	1[4]	---	40 weeks
	100 mice	---	---	---	---	--do--	---	35 weeks
Burrows et al., 1936	8 mice	---	---	0.2 to 0.5 cc.[3]	S.C., groin	0	3 alive at 4 mos.	259 days
	10 mice	---	---	5% in olive oil, 0.2 to 0.5 cc.	S.C., breast	0	6 alive at 4 mos.	574 days
	10 rats	Het.	---	5% in lard, 1 cc. weekly	S.C.	1	7 alive at 4 mos.	89 weeks
	10 rats	Het.	---	--do--	I.P.	0	---	89 weeks

1. No significant pathological changes
2. Epithelial proliferation and infiltration of groups of epithelial cells resembling early carcinoma following primary abscess
3. Also injection into back (2 animals) and abdominal cavity (2 animals)
4. Benign
5. Commercial grade used throughout

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
174.--OLEIC ACID $CH_3(CH_2)_7CH{=}CH(CH_2)_7COOH$ (Continued)								
Burrows and Boyland, 1938	1 rabbit	---	F	5% in olive oil; repeated inj.	Mammary ducts	0	---	1,855 days
Chevrel-Bodin and Cormier, 1943	4 rabbits	---	---	0.04 cc. in 1 cc. olive oil, 3 times a week	S.C.	Tumors[1]	---	1 year
175.--PALMITIC ACID $CH_3(CH_2)_{14}COOH$								
White, C.P., 1909	Rabbits	---	---	Aqueous suspension	S.C.	0[2]	---	---
White, C.P., 1910	1 rabbit	---	---	Suspension in saline	S.C., ear	--do--	---	---
Takahashi, 1926	12 rats	---	---	10% in food	P.O.	0	---	40-120 days
176.--PANTOYLTAURINE $HOCH_2C(CH_3)_2CHOHCONHCH_2CH_2SO_3H$								
Unna, 1943	6 rats Rats	Albino ---	M ---	1 mg.[3] 25 mg.[3]	P.O.[4] --do--	0 0	--- ---	80 days 7 weeks
177.--PENTAERYTHRITOL TETRANITRATE $C(CH_2ONO_2)_4$								
Donahue and Monaco, 1944	45 rats	Albino	M & F	2 mg. per kg. body wt., daily in food	P.O.	0	Low mortality	1 year
178.--POLYVINYL ALCOHOL $(CH_2{=}CHOH)_n$								
Hueper, 1939	12 rats 1 rabbit	--- ---	--- M	5% aq. soln., 1 cc. 5 times weekly for 4 weeks 5% in saline, 10-20 cc. 5 times weekly	S.C. I.V., ear	0 0	--- ---	6 weeks 5 weeks
Hueper et al., 1940	1 dog	---	---	5% aq. soln., 60-75 cc. 5 times weekly for 2 weeks	I.P.	0	---	92 days
Hueper, 1941	2 dogs	---	---	5% in saline, 60-70 cc. repeated inj.	I.P.	0	---	92 days
Foster and Jenkins, 1944	24 rats	---	---	10-1000 mg.	I.P.	0	---	At least 8 weeks
179.--POTASSIUM ACID SACCHARATE $HOOC{-}(CHOH)_4{-}COOK$								
Carr, 1947b	30 rats	---	M & F	5% in food	P.O.	0	---	Ca. 7 mos.
180.--PROPIONALDEHYDE CH_3CH_2CHO								
Riley and Wallace, 1941	50 mice	Inbred strain	M	8.9 cc. in 1 liter Ringer-Locke soln., 0.5 cc. 2 times weekly for 16 weeks	S.C.	0	25 alive at 40 weeks	40 weeks
181.--PROPYL ALCOHOL C_3H_7OH								
Nakahara and Mori, 1939	Rats	---	---	In food	P.O.	0[5]	---	Over 300 days

1. First tumors in 4 to 12 weeks
2. Epithelial proliferation and infiltration of groups of epithelial cells resembling early carcinoma following primary abscess
3. Also some calcium pantothenate
4. By stomach tube
5. No significant pathological changes

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
181.--PROPYL ALCOHOL C_3H_7OH (Continued)								
Nakahara and Mori, 1940	Rats	---	---	In food	P.O.	0		At least 300 days
182.--PROPYL CARBAMATE $H_2N-COOCH_2CH_2CH_3$								
Larsen and Heston, 1945	Mice	A & C	M & F	---	I.P.	0	---	6 mos.
183.--PROPYLENE GLYCOL $CH_3CHOHCH_2OH$								
Seidenfeld and Hanzlik, 1932	20 rats	---	---	1% to 10% in water[1]	P.O.	0	---	At 140 days
Braun and Cartland, 1936	11 rabbits	---	---	1 to 8 cc. per kg. body wt., daily, as 20% aq. soln.	P.O.[2]	0	---	50 days
Holck, 1937	6 rats	---	---	3.58% in water	P.O.	0	1 died at 10 weeks	Over 11 weeks
Weatherby and Haag, 1938	25 rats	---	M	0.1% to 10.0% in water	P.O.	0	23 alive at 100 days	100 days
Hanzlik et al., 1939a	10 rats	---	---	12.1% and 24.3% in food[1]	P.O.	0	---	24 weeks
	6 rats	---	---	12.8% of diet	P.O.[2]	0	---	Ca. 5 mos.
Hanzlik et al., 1939b	8 rats	---	---	12.5% and 25% of diet	P.O.	0	---	5-1/2 mos.
	4 rats	---	---	12.8% of diet	P.O.[2]	0	---	5 mos.
Kesten et al., 1939	39 rats	---	---	1-10% in water	P.O.	0	---	11-234 days
	15 rabbits	---	---	2-5 cc. per kg. body wt., single inj.	I.V.	0	---	2-46 days
Van Winkle, Jr., 1941	5 rats	---	---	10 cc. per kg. body wt., daily	P.O.[2]	0	---	15 weeks
Van Winkle, Jr. and Newman, H. W., 1941	4 dogs	---	F	5% in water	P.O.	0	---	5-9 mos.
	4 dogs	---	M	10% in water	P.O.	0	---	5-6 mos.
	5 rats	---	---	Soln. in water[3]	P.O.	0	---	163 days
Morris et al., 1942	20 rats	Inbred	M & F	2.45% and 4.9% in food	P.O.	0	---	2 years
Robertson et al., 1947	20 rats	White	M & F	0.17-0.35 mg./liter	Inhalation	0	---	18 mos.
	29 monkeys	Macacus	---	0.23-0.35 mg./liter	--do--	0[4]	---	13 mos.
184.--RICINOLEIC ACID $CH_3(CH_2)_5CHOHCH_2CH=CH(CH_2)_7COOH$								
Chevrel-Bodin and Cormier, 1943	4 rabbits	---	---	0.04 cc. in 1 cc. olive oil, 3 times a week	S.C.	Tumors[5]	---	1 year
185.--dl-SERINE $CH_2OHCHNH_2COOH$								
Morehead et al., 1945	2 rats	White	M	100 mg. in 3 cc. water daily, 14 days[6]	P.O.[2]	0	Killed at 14-19 days	33 days

1. Higher concentrations caused high mortality
2. By stomach tube
3. Dose 1/4 the caloric content of the carbohydrate in the diet
4. No ill effects
5. First tumors in 4 to 12 months
6. Plus stock diet

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
185.--dl-SERINE $CH_2OHCHNH_2COOH$ (Continued)								
Morehead et al., 1945	2 rats	White	M	100 mg. in 3 cc. water daily, 14 days[1]	P.O.[2]	0	Killed at 14-19 days	33 days
186.--SORBITOL $C_6H_8(OH)_6$								
Ellis and Krantz, Jr., 1941	20 rats	---	M	5% in food	P.O.	0	---	3 mos.
	12 monkeys	Macacus rhesus	---	3 g. in food, daily	P.O.[2]	0	---	3 mos.
Ellis et al., 1943	80 rats	---	M & F	5% in food	P.O.	0	---	20 mos.
187.--STEARIC ACID $CH_3(CH_2)_{16}COOH$								
Takahashi, 1926	10 rats	---	---	10% in food	P.O.	0	---	30-140 days
188.--TETRACHLOROETHANE $CHCl_2CHCl_2$								
Bollman and Mann, 1931	1 dog	---	---	1 cc. 150 times	P.O.	0[3]	---	At least 15 mos.
189.--THIODIGLYCOL $(HOCH_2CH_2)_2S$								
Berenblum, 1935	Mice	---	---	In acetone, weekly, 3 applications	Skin	0	---	1 mo.
190.--THIOUREA H_2NCSNH_2								
Flinn, and Geary, 1940	4 dogs	Dachshund	---	25 mg. per kg. body wt., daily in food	P.O.	0	---	10 weeks
	8 rabbits	---	---	25 mg. per kg. body wt., daily in water	P.O.	0	---	12 weeks
	22 rats	---	---	25-60 mg. per kg. body wt., daily in water	P.O.	0	---	12 weeks
Hartzell, 1940	6 guinea pigs	---	M	0.1 to 5.0% aq. soln. in food	P.O.	0	---	6 weeks
	3 dogs	---	M	1 g. per kg. body wt. in water	P.O.[2]	0	---	60 days
Keston, A.S. et al., 1944	Rats	---	M	1% in food	P.O.	0	---	At least 2 mos.
Dalton et al., 1945	21 mice	C3H	F	0.25 to 0.375% in food	P.O.	0	---	45 weeks
Hartzell, 1945	30 rats	Albino	M	1.72 mg./kg. in drinking water, daily	P.O.	0	27 alive at 1 year	At least 3 years
	29 rats	--do--	M	6.88 mg./kg. in drinking water, daily	P.O.	0	28 alive at 1 year	--do--
	30 rats	--do--	M	27.5 mg./kg. in drinking water, daily	P.O.	0	29 alive at 1 year	--do--
May et al., 1946	Rats	Wistar	---	1-0.5% in food	P.O.	0	---	54 days
Morris et al., 1946	27 mice	C3H	F	2.5 gm./kg. to 3.75 gm./kg. after 13 weeks; in food	P.O.	20 mammary[5]	---	At least 63 weeks
Purves and Griesbach, 1946	30 rats	Wistar	---	0.25% in drinking water	P.O.	Tumors[4]	---	At least 22 mos.

1. Plus experimental diet
2. By stomach tube
3. Cirrhosis of the liver
4. Most had thyroid tumors, two malignant
5. Incidence no higher than in controls

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
190.--THIOUREA H_2NCSNH_2 (Continued)								
Dieke, 1947	5 rats	Black Norway	M & F	0.1-0.5% in food	P.O.	0	---	At least 282 days
Purves and Griesbach, 1947	30 rats	Norway & Wistar	M & F	0.25% soln. in drinking water	P.O.	Tumors[1]	---	5-23-1/2 mos.
191.--TRIACETIN $C_3H_5(CH_3COO)_3$								
Takahashi, 1926	4 rats	---	M	5 and 10% in food	P.O.	0	---	80-100 days
192.--TRIARACHIDIN $C_3H_5[CH_3(CH_2)_{18}COO]_3$								
Takahashi, 1926	4 rats	---	M & F	5 and 10% in food	P.O.	0	---	50-80 days
193.--TRIBUTYRIN $C_3H_5(CH_3CH_2CH_2COO)_3$								
Takahashi, 1926	4 rats	---	M	5 and 10% in food	P.O.	0	2 died in Ca. 20 days	150 days
194.--TRICAPRIN $C_3H_5[CH_3(CH_2)_8COO]_3$								
Takahashi, 1926	4 rats	---	M & F	5 and 10% in food	P.O.	0	---	110-190 days
Evans and Lepkovsky, 1932	10 rats	---	---	22.7% in food[2]	P.O.	0	---	100 days
195.--TRICAPRYLIN $C_3H_5[CH_3(CH_2)_6COO]_3$								
Takahashi, 1926	4 rats	---	M & F	5 and 10% in food	P.O.	0	---	100-170 days
Evans and Lepkovsky, 1932	12 rats	---	---	22.7% in food[3]	P.O.	0	---	100 days
196.--TRICEROTIN $C_3H_5[CH_3(CH_2)_{24}COO]_3$								
Takahashi, 1926	2 rats	---	M	10% in food	P.O.	0	---	30- and 50-days
197.--TRICHLOROACETIC ACID CCl_3COOH								
Berenblum, 1935	Mice	---	---	In acetone, weekly, 3 applications	Skin	0	---	1 mo.
198.--TRICHLOROETHYLENE $ClCH{=}CCl_2$								
Seifter, 1944	16 dogs	---	---	150-750 p.p.m. in air, 20-48 hrs. per week for 7-16 weeks	Inhalation	0[4]	---	16 weeks
199.--TRIETHYLENE GLYCOL $HOCH_2CH_2OCH_2CH_2OCH_2CH_2OH$								
Lauter and Urla, 1940	15 rats	---	M & F	0.1 to 20 cc. per kg. body wt., daily for 30 days	P.O.[5]	0	All lived	45 days
	20 rats	---	M & F	3-10% (by vol.) in water for 30 days	P.O.	0	7 died by 15 days	--do--

1. 21 adenomas, begnign; 4 foetal adenomas; 7 carcinomas
2. 35% diglyceride
3. 8% diglyceride
4. Liver injury
5. By stomach tube

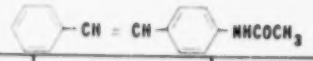
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
199.--TRIETHYLENE GLYCOL $HOCH_2CH_2OCH_2CH_2OCH_2CH_2OH$ (Continued)								
Fitzhugh and Nelson, 1946a	Rats	Osborne Mendel	M	1% in food	P.O.	0	---	2 years
	Rats	--do--	M	2% in food	--do--	0	---	--do--
	Rats	--do--	M	4% in food	--do--	0	---	--do--
Robertson, O.H. et al., 1947	60 rats	---	M & F	0.0025-0.005 mg./l.	Inhalation	0[1]	---	13 mos.
	8 rats	---	--do--	0.004 mg./kg. per day	P.O.	0	---	At least 13 mos.
	25 monkeys	---	---	0.0031-0.0046 mg./l.	Inhalation	0	---	At least 13 mos.
	8 monkeys	---	---	0.004 mg./l. daily	P.O.	0	---	At least 14-1/2 mos.
200.--TRILAURIN $C_3H_5[CH_3(CH_2)_{10}COO]_3$								
Takahashi, 1926	6 rats	---	M & F	5-20% in food	P.O.	0	---	60-160 days
	2 rats	---	M	10% in food	P.O.	0	---	140 days
Evans and Lepkovsky, 1932	12 rats	---	---	22.7% in food[2]	P.O.	0	---	Less than 100 days
201.--TRILINOLEIN $C_3H_5[CH_3(CH_2)_4CH=CHCH_2CH=CH(CH_2)_7COO]_3$								
Takahashi, 1926	4 rats	---	M & F	5 and 10% in food	P.O.	0	---	60-70 days
202.--TRIMETHYLENE GLYCOL $HOCH_2CH_2CH_2OH$								
Van Winkle Jr., 1941	10 rats	---	---	5% and 12% in food	P.O.	0	---	15 weeks
	10 rats	---	---	5 cc. and 10 cc. per kg. body wt., daily	P.O.[3]	0	---	15 and 5 weeks, respectively
203.--TRIMYRISTIN $C_3H_5[CH_3(CH_2)_{12}COO]_3$								
Takahashi, 1926	6 rats	---	M & F	5-20% in food	P.O.	0	---	40-190 days
Evans and Lepkovsky, 1932	12 rats	---	---	22.7% in food[4]	P.O.	0	---	Less than 100 days
204.--TRIOLEIN $C_3H_5[CH_3(CH_2)_7CH=CH(CH_2)_7COO]_3$								
Takahashi, 1926	6 rats	---	M & F	5-20% in food	P.O.	0	---	30-70 days
	3 rats	---	M	10% in food	P.O.	0	---	120-150 days
Burrows et al., 1936	10 mice	---	---	0.2 to 0.5 cc.	S.C., groin	0	7 alive at 4 mos.	540 days
205.--TRIPALMITIN $C_3H_5[CH_3(CH_2)_{14}COO]_3$								
Takahashi, 1926	6 rats	---	M & F	5-20% in food	P.O.	0	---	50-120 days
	2 rats	---	M	10% in food	P.O.	0	---	130 days

1. No ill effects
2. 21% diglyceride
3. By stomach tube
4. 44% diglyceride

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
205.--TRIPALMITIN $C_3H_5[CH_3(CH_2)_{14}COO]_3$ (Continued)								
Evans and Lepkovsky, 1932	12 rats	---	---	22.7% in food[1]	P.O.	0	---	Less than 100 days
206.--TRISTEARIN $C_3H_5[CH_3(CH_2)_{16}COO]_3$								
Takahashi, 1926	8 rats	---	M & F	5-20% in food	P.O.	0	---	30-60 days
	2 rats	---	M	10% in food	P.O.	0	---	140-170 days
Evans and Lepkovsky, 1932	12 rats	---	---	22.7% in food[2]	P.O.	0	---	Less than 100 days
207.--TRIVALERIN $C_3H_5[CH_3(CH_2)_3COO]_3$								
Takahashi, 1926	4 rats	---	M & F	5 and 10% in food	P.O.	0	---	80-110 days
208.--UREA NH_2CONH_2								
Shear, 1941	20 mice	A	M	50 mg. crystals, repeated inj.	S.C.	0	---	11 mos.
	10 mice	C57, black	M	--do--	S.C.	0	---	14 mos.
Shear and Leiter, 1941b	20 mice	A	M	800 mg. crystals (total dose)	S.C.	0	19 alive at 1 year	15 mos.
	10 mice	C57, black	M	--do--	S.C.	0	5 alive at 15 mos.	15 mos.
209.--γ-VALEROLACTONE $CH_3-CH-CH_2-CH_2$ (O—C=O)								
Deichmann et al., 1945	10 animals[3]	---	---	3-10 mg. per liter as vapor and mist in air, per day	Inhalation	0	---	60 days
	--do--	---	---	2.2-2.9 mg. per liter in air	--do--	0	---	90 days

1. 71% diglyceride
2. 69% diglyceride
3. Rabbits, rats, and mice

B. ORGANIC COMPOUNDS 2. MONOCYCLIC

210.--4-ACETAMINOSTILBENE 

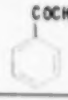
Reference	Animals	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Haddow, et al., 1948	12 rats	Albino	---	3x2 mg. soln. in arachis oil, once a month	S.C.	1[1]	---	Ca. 339 to 555 days

211.--ACETANILIDE

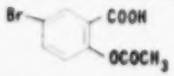
Loon and Clark, 1944	4 dogs	---	M & F	9-144 mg./kg. daily in food	P.O.	0	---	At least 110 days

212.--ACETOPHENETIDIN

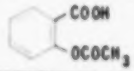
Loon and Clark, 1944	6 dogs	---	M & F	15-120 mg. for 43 to 150 days	P.O.	0	---	At least 133 days

213.--ACETOPHENONE 

Hosino, 1940b	Rabbits	---	---	Daily for 40 days	S.C. or I.V.	0	---	At least 40 days

214.--ACETYL-5-BROMOSALICYLIC ACID 

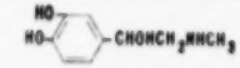
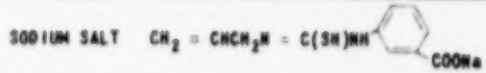
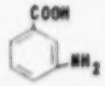
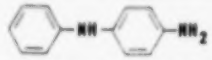
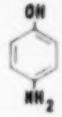
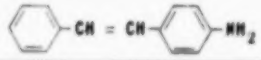
Krantz, Jr. et al., 1946	6 rats	Albino	M	0.2%-0.5% in food	P.O.	0	---	8 weeks

215.--ACETYLSALICYLIC ACID 

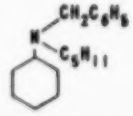
Haerem, 1941	10 rats	---	---	15 mg. in lard, 2 times	Inj.	0	---	Ca. 13 mos.
Boughton and Stoland, 1943	8 rats	Wistar	---	In food	P.O.	0[2]	2 died at 58 weeks	82 weeks
Krantz, Jr. et al., 1946	3 rats	Albino	M	0.5% in food	P.O.	0	---	8 weeks
Ichniowski and Hueper, 1946	50 rats	---	M & F	5-200 mg./kg., 5 times weekly for 13 weeks in suspension in aq. gum tragacanth	P.O.	0	---	20 weeks

1. At or near site; carcinoma of the acoustic duct.

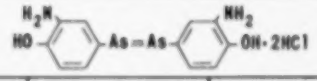
2. No autopsies

Reference	Animals	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
216.--ADRENALINE 								
Bauer, J. 1937	Rabbits	---	---	Small doses	Inj.	0	---	Several weeks
Bauer, et al., 1937	2 rabbits	---	---	0.25 mg. as the hydrochloride, 39 injections	S.C.	0	---	14 weeks
Enger, 1940	4 dogs	---	---	0.2-50 mg. daily	Inj.	0	---	Ca. 2 years
217.--N-ALLYL-N'-(m-CARBOXYPHENYL)-ISO-THIOUREA, SODIUM SALT 								
Huter, 1947	Rabbit	Albino	---	5.255 g. in 43 days	S.C.	0	---	Ca. 43 days
218.--m-AMINOBENZOIC ACID 								
Hosino, 1940a	Rabbits	---	---	Daily for 40 days	S.C. or I.V.	0	---	At least 40 days
219.--4-AMINODIPHENYLAMINE 								
Shear and Stewart, 1941	16 mice	A	---	1/4 saturated soln. in lard-glycerol mixture, 0.1 cc. repeated injection	S.C.	0	---	14 mos.
	20 mice	A	M & F	--do--	S.C.	0	---	16 mos.
220.--p-AMINOPHENOL 								
Haxthausen, 1916	Rabbits	---	---	20% in salve, or 10% in collodion every day or 3 days	Skin painting	0[1]	---	1 mo.
221.--4-AMINOSTILBENE 								
Haddow, et al., 1948	12 rats	Albino	---	8x5 mg. soln. in arachis oil, 1 per mo.	S.C.	Sarc.[2]	---	Ca. 372-449 days
	24 rats	--do--	M & F	7x2 mg. soln. in arachis oil, 1 per week	S.C.	5[3]	---	Ca. 165-488 days
	24 mice	Stock	M & F	9x0.5 mg. in arachis oil, 1-2 per week	S.C.	0	8 alive at 18 mos.	Ca. 18 mos.

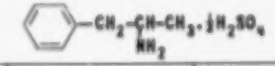
1. Slight thickening of epithelium
2. At or near site. 4 mammary adenomata distant from site
3. 5 carcinoma of the acoustic duct, mammary adenoma

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
				222.--N-AMYL-N-BENZYL-CYCLOHEXYLAMINE 				
Deichmann and Kitzmiller, 1940	6 rats	---	---	0.1 cc.; 90 applications	Skin	0	---	105 days
	10 rats	---	---	Ca. 1.2 cc. per kg. body wt. daily, in food	P.O.	0	---	28 weeks
	2 rabbits	---	---	"Practically soaked" with 1:400 emulsion, 6 times weekly	Skin	0	---	60 days
	4 guinea pigs	---	---	--do--	--do--	0	---	--do--
	5 rats	---	---	--do--	--do--	0	---	--do--
				223.--ANILINE				
Stoeber, 1909	Rabbit	---	---	In olive oil	S.C., ear	0	---	---
Haxthausen, 1916	8 rabbits	---	---	20% in salve, or 10% in collodion, every 1 or 3 days	Skin painting	0[1]	---	1 mo
Jaffe, 1920	3 mice	---	---	Vapors	Inhalation	0[2]	Majority alive at 6 mos.	Over 1 year
	3 rats	---	---	--do--	--do--	--do--	--do--	--do--
	3 rabbits	---	---	--do--	--do--	--do--	--do--	--do--
Kennaway, 1924c	Mice	---	---	---	Skin painting	0	---	---
Bauer, T., 1926	Rabbits	---	---	---	Bladder	Pap.	---	At least 6 weeks
Roffo, 1931	10 rats	---	---	With resin pearls	I.P.	Pap.[3]	---	1 to 8 mos.
	10 rats	---	---	--do--	S.C.	Pap.	---	--do--
	10 rats	---	---	--do--	Stomach	0[4]	---	--do--
Perlmann and Staehler, 1932a	10 rabbits	---	---	1 mg. daily	S.C.	1 pap.[5]	---	---
	20 rabbits	---	---	10 mg. daily	S.C.	0	---	---
	9 rabbits	---	---	0.5 mg. with 0.5 mg. β-naphthylamine in alcohol, daily	S.C.	0	---	---
Perlmann and Staehler, 1932b	10 rabbits	---	---	1 mg. in alcohol, daily	S.C.	1[6]	7 died in 6 mos.	At least 11 mos.
	20 rabbits	---	---	10 mg. in alcohol daily	S.C.	0	11 died in 6 mos.	Ca. 8 mos.
	9 rabbits	---	---	0.5 mg. with 0.5 mg. β-naphthylamine daily	S.C.	0	7 died in 6 mos.	At least 6 mos.
Perlmann and Staehler, 1933	35 rabbits	---	---	At least 1 mg. daily	S.C.	1[6]	---	---

1. Very considerable thickening of epidermis with penetration into connective tissue
2. Changes in organs noted
3. Of bladder. Similar to results with resin pearls alone but more pronounced
4. Resin pearls eliminated
5. Of bladder
6. Fibroepithelioma of bladder

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
223.--ANILINE (Continued)								
Maruya, 1937	Rats	---	---	---	P.O.	0	---	---
Yamazaki and Sato, 1937	37 rabbits	---	M	1% or 5% or 10% in water, 10 cc. daily	Bladder	12[1]	7 died in 15 days	362 days
	12 rabbits	---	M	1% aqueous soln. 1 cc. daily	S.C.	0	5 died in 60 days	216 days
Shear and Stewart, 1941	10 mice	Stock	F	0.5% in lard, 0.25 cc. repeated injection	S.C.	0	5 alive at 24 mos.	24 mos.
	10 mice	D	F	--do--	--do--	0	--do--	--do--
	10 mice	Stock	F	--do--	--do--	0	--do--	--do--
White, J. and Edwards, J.E., 1942d	Rats	---	---	0.08% in food	P.O.	0	---	---
Hartwell and Andervont, unpub. results	20 mice	C	F	5 mg. in olive oil, 8 injections	S.C.	0	---	15 mos.
224.--ANILINE HYDROCHLORIDE								
Hartwell and Andervont, unpub. results	11 mice	C	F	4 mg. in aqueous soln. 13 injections	S.C.	0	---	12 mos.
White, J., and Edwards, J.E., 1942a	183 rats	Osborne-Mendel	M	0.08% in food	P.O.	0	---	Ca. 145 days
225.--ARSPHENAMINE 								
Ebert, 1929	1 rabbit	---	F	in water, 5 injections	I.M.	0	---	2.5 mos.
226.--AURAMINE, base								
Yao, 1937	Rats	White	---	in food	P.O.	0[2]	---	---
227.--BENZALDEHYDE								
Hosino, 1940b	Rabbits	---	---	Daily for 40 days	S.C. or I.V.	0	---	At least 40 days

1. Of bladder, all in 1% solution series
2. Proliferation of bile duct epithelium

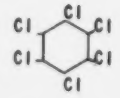
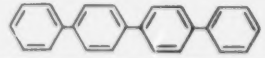
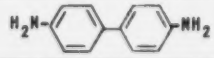
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
227.--BENZALDEHYDE (Continued)								
Nakahara and Mori, 1941a	Rats	---	---	In food	P.O.	0[1]	---	---
228.--BENZEDRINE SULFATE 								
Davis, J.E., 1941	4 dogs[2]	---	---	10 mg. daily	P.O.[3]	0	---	Ca. 36 days
229.--BENZENE								
Kennaway, 1924a	Several hundred mice	---	---	---	Skin Painting	0	---	9 mos.
Lignac, 1932	26 mice	[illegible]	M & F	0.005 cc. in olive oil 3 times weekly	S.C.	0[4]	High mortality	At least 11 weeks
	54 mice	White	M & F	0.001 cc. in olive oil weekly	S.C.	2[5]	9 died from infection and 12 from spleen atrophy	--do--
Lignac, 1933	54 mice	---	M & F	0.001 cc. in olive oil weekly	Inj.	3[6]	21 died early	At least 11 mos.
Picard and Leduron, 1934b	5 mice	---	---	0.25% in emulsion 1 cc. daily; 14 days	I.P. & S.C.	0	All dead in 121 days	121 days
Hess, 1935	140 mice	White	---	1% in olive oil, 0.1 cc. weekly	S.C.	1[7]	---	230 days
Bernard, 1936	4 rats	White	---	0.02 to 0.1 cc. every 5 to 7 days	Intramedullary	0	---	1 mo.
Dyadyusha, 1937	Mice	---	---	Every 3 days	Skin	0	All died of epidemic at 5-1/2 mos.	5-1/2 mos.
Bergmann, et al., 1938	24 mice	CBA	---	Twice weekly	Skin of back	0[8]	---	18 mos.
Hanaguti and Yosida, 1938a	110 mice	---	---	0.001 cc. weekly	Inj.	1[9]	---	At least 60 weeks
	66 rats	---	---	Small dose	Inj.	0[10]	---	--do--

1. Also no liver changes
2. One splenectomized
3. By stomach tube
4. In 3 cases liver showed "multicentric blastoma-like enlargement of a myelopotent tissue"
5. Lymphosarcomas (intra-thoracic and mediastinal); also 6 leukemias.
6. Intrathoracic, mediastinal, among 8 with leukemia or lymphosarcomatosis
7. Lymphoma of liver, also general leukemia after 166 days
8. Increase of pigmentation at site
9. Xanthosarcoma in mediastinum; in 2 cases sarcomatous changes of mediastinal lymph nodes. Changes in organs noted
10. Changes in organs noted

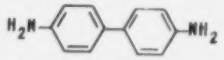
229.--BENZENE (continued)

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Hamaguti and Yosida, 1938b	Mice	---	---	Very small dose weekly	Inj.	0	---	A long period of time
	Rats	---	---	--do--	Inj.	0	---	--do--
Orr, 1938b	15 mice	Stock	---	Weekly applications	Skin	0	---	23 weeks
Page, 1938	32 mice	---	---	3 times weekly	--do--	0	---	140 days
Hamaguti, et al., 1939	100 mice	---	---	0.001 cc. weekly	Inj.	2[1]	---	Ca. 15 weeks
Mider and Morton, 1939a	50 mice	dba	M & F	Twice weekly	Skin painting	0	---	225 days
Oestreicher, 1939	34 rats	---	---	0.1 to 1 cc. in oil per kg. body wt. daily	S.C.	0	---	1 year
Aivasian, 1940	40 mice	---	---	1 drop every 3 days for 4 mos.	Skin	0	---	Over 4 mos.
Bergmann, et al., 1940	40 mice	CBA	---	Bi-weekly	Skin painting	0	---	34 mos.
	18 mice	F	---	--do--	--do--	0[2]	---	--do--
Burr, et al.,	15 mice	CBA	---	2 times	--do--	0	---	26 weeks
Druckrey, 1940	70 mice	---	---	Twice a week	Skin	0	All dead at 13-1/2 mos.	13-1/2 mos.
Takizawa, 1940a	Mice	---	---	Every 1 or 2 days	Skin	1 pap.[3]	46 alive at 200 days	More than 200 days
Takizawa, 1940b	Mice	Stock	---	Every 1 or 2 days	Skin painting	1 pap.	--do--	--do--
Burdette and Strong 1941	25 mice	8 inbred strains	---	Bi-weekly	Skin painting	0	20 alive at 114 days	400 days
Latta and Davies, 1941	Rats	Albino	---	50% in olive oil, 2-4 cc. per kg. body wt., daily	S.C.	0	---	Up to 60 days
Loeper, et al., 1941	5 guinea pigs	---	---	---	Inhalation	0	---	11-106 days
Morton and Mider, 1941	50 mice	dba	---	2 times weekly	Skin painting	11[4]	6 alive at 540 days	540 days
Takizawa, 1941	Mice	---	---	---	Skin painting	Tumors[5]	28 alive at 200 days	786 days
Kirschbaum and Strong, 1942	29 mice	F	---	2 times weekly	Skin painting	0[6]	---	440 days
	20 mice	F	---	0.001 cc. in sesame oil, weekly	S.C.	0[7]	---	375 days

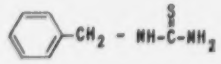
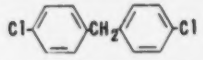
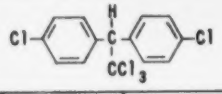
1. Mediastinal. Also in 16 cases, advanced leukemia. Changes in certain organs than in untreated controls
2. Mammary gland carcinoma obtained at average age of 602 days but no higher
3. Also two lung cancers
4. Total leukoses
5. Of the lung. One adenomatous tumor
6. Two developed leukemia before 300 days
7. Six developed leukemia before 300 days

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
229.--BENZENE (Continued)								
Friedewald and Rous, 1944a	6 rabbits	---	---	Twice weekly	Skin	0[1]	---	462 days
Silberberg, M. and Silberberg, R., 1944	7 mice	Swiss	---	---	Skin painting	0	---	28 days
Svirbely et al., 1944	40 rats	Wistar	M & F	1000 p.p.m. a vapor in air; 7 hrs, daily, 5 days per week	Inhalation	0	---	28 weeks
Pfeiffer and Allen, 1945	Macacus rhesus	---	---	---	Skin	0	---	1-2 years
Wicks, 1945	Mice	New Buffalo	M & F	Single or multiple application	Skin	0	---	60 days
230.--BENZENE HEXACHLORIDE 								
Létard and de Sacy, 1945	Rats	---	---	---	[3]	---	---	---
	Mice	---	---	1% in olive oil	S.C.	0	---	---
	Rabbits	---	---	---	Inhalation	0	---	6 mos.
	10 mice	---	---	1% in oil, daily	Skin painting	0	---	3 mos.
	Rabbit	---	---	3% in talcum powder on the eye	---	0	---	---
231.--BENZERYTHRENE 								
Twort and Fulton, 1930	Mice	---	---	In liquid paraffin	Skin painting	0	---	40 weeks
	--do--	---	---	In oleic acid	--do--	0	---	50 weeks
232.--BENZIDINE 								
Haxthausen, 1916	Rabbits	---	---	20% salve or 10% in collodion every 1 or 3 days	Skin painting	0	---	1 mo.
Jaffé, 1920	3 mice	---	---	Vapors	Inhalation	0	All died in 6 weeks	6 weeks
	3 rats	---	---	--do--	--do--	0	--do--	--do--
	3 rabbits	---	---	--do--	--do--	0	--do--	--do--
Bierich, 1922	Mice	---	---	---	Skin painting	1	---	---
Kennaway, 1924a	100 mice	---	---	In "90% benzol."	Skin painting	0	---	9 mos.
Berenblum and Bonser, 1937	24 rabbits	---	---	1%[2] suspension in water, 15 cc.; average of 76 injections	I.P.	0	9 alive at 6 mos.	4 years, 1 mo.

1. But few benign tumors present
2. Substance purified
3. By stomach tube

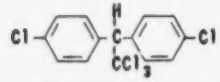
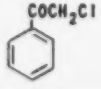
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
232.--BENZIDINE (Continued) 								
Berenblum and Bonser, 1937	29 rats	---	---	Along with aniline and β-naphthylamine in food	P.O.	0	---	76 weeks
Yoshida, et al., 1941a	Rats	White	---	Crystals in collodion	Bladder	Pap.	---	125 days
Rhoads,a[1]	459 rats	---	---	(2) (3)	P.O.	17[4]	---	Up to 607 days
	11 rabbits	---	---	(2)	P.O.	0	---	---
	5 dogs	---	---	(2)	P.O.	0	---	---
	70 rats	---	---	(5)	P.O.	1[6]	---	Up to 353 days
233.--BENZIDINE SULFATE								
Rhoads,[1]	231 rats	---	---	---	P.O.	2[7]	---	460 days
234.--BENZOIC ACID								
Hosino, 1940a	Rabbits	---	---	Daily for 40 days	S.C. or I.V.	0	---	At least 40 days
Hosino, 1940b	Rabbits	---	---	Daily for 40 days	S.C. or I.V.	0	---	At least 40 days
235.--BENZOQUINONE								
Takizawa, 1940a	Mice	Stock	---	0.1% or 0.25% in benzene every 1 or 2 days	Skin painting	5 epi.[8] 7 pap.	87 alive at 200 days	387 days
Takizawa, 1940b	Mice	---	---	0.25% in benzene every 1 or 2 days	Skin	1 epi.[9] 3 pap.	44 alive at 200 days	Over 300 days
	Mice	---	---	0.1% in benzene every 1 or 2 days	Skin	2 epi[10] 6 pap.	41 alive at 200 days	Over 300 days
Takizawa, 1941	Mice	---	---	In benzene soln.	Skin painting	3[11]	99 alive at 200 days	Over 200 days

1. Personal communication to Dr. Paul A. Neal, 1946
2. Technical grade
3. Under various dietary regimes
4. Liver cancers both hepatomas and cholangiomas; also 52 with squamous carcinoma of buccal mucosa
5. Pure grade
6. Liver cancer; also 4 cancers of buccal mucosa and one leukemia
7. Liver cancer; also 16 cancers of buccal mucosa and 6 leukemias
8. Also 8 primary lung cancers
9. Also 5 lung cancers. 1 papilloma and 2 lung cancers out of 46 mice in controls with benzene
10. Also 10 lung tumors
11. Pulmonary adenocarcinomas

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
236.--BENZYL ALCOHOL								
Hosino, 1940b	Rabbits	---	---	Daily for 40 days	S.C. or I.V.	0	---	At least 40 days
237.--BENZYL MERCAPTAN								
Hammett, 1951	219 mice	---	---	5% in alcohol-glycerine or 5% in liquid petrolatum	Skin	0[1]	---	4-1/2 to 6 mos.
Reimann, 1951	Mice	---	M & F	5% in alcohol-glycerine or 5% in liquid petrolatum, 3 times weekly	Skin	Pap.	---	11 mos.
238.--BENZYL THIOUREA 								
Hüter, 1947	Rabbit	---	---	110 mg. in olive oil, 6 days a week	S.C.	0	---	4 mos.
	--do--	---	---	150 mg. per day	P.O.	0	---	35 days
Wagner-Jauregg and Koch, 1947	2 rabbits	---	M & F	75 mg. per day	S.C.	0	---	72-83 days
239.--bis (p-CHLOROPHENYL)-METHANE 								
Lillie et al., 1947	5 rabbits	---	---	50 mg. per kg., 32 doses	---	0	---	22-37 days
240.--2,2-bis(p-CHLOROPHENYL)-1,1,1-TRICHLOROETHANE 								
Bing et al., 1946	28 dogs	---	---	100-450 mg. in peanut oil, 6 times weekly	P.O.[2]	0	---	5 mos.
Draize et al., 1944	Dogs	---	---	10-100 mg./kg. body wt., daily, in food	P.O.	0	---	50 weeks
	Rats	---	---	100-800 p.p.m. in diet	P.O.	0	---	---
Lillie and Smith 1944	Rats	---	---	0.1% in food	P.O.	0	---	98 days
	11 rabbits	---	---	---	Skin	0	---	26-45 days
Nelson et al., 1944	6 rats	---	M & F	30% in org. solvent; 150-600 mg./kg. body weight, daily	Skin	0	---	35-92 days
	8 rats	---	---	250-1000 p.p.m. in food	P.O.	0	---	9-32 weeks
	4 rabbits	---	M & F	30% in org. solvent; 150 and 300 mg./kg. body wt./day	Skin	0	---	37-91 days
	1 guinea pig	---	M	30% in org. solvent; 600 mg./kg. body weight daily	Skin	0	---	35 days

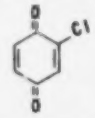
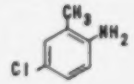
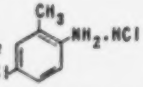
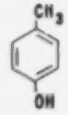
1. Epithelial cell proliferation noted

2. By stomach tube

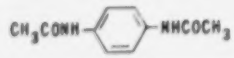
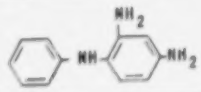
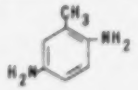
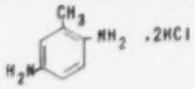
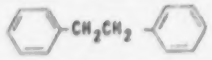
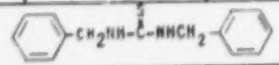
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
240.--2,2-bis(p-CHLOROPHENYL)-1,1,1-TRICHLOROETHANE (Continued) 								
Nelson et al., 1944	13 guinea pigs	---	M & F	250-1000 p.p.m. in food	P.O.	0	---	6-25 weeks
	2 mice	---	M & F	50 and 100 mg./kg. body daily in corn oil	P.O.[1]	0	---	6 weeks, 7 mos.
Smith and Stohlman, 1944	10 rats	---	---	0.1% in food	P.O.	0	All died in 80 days	80 days
	Rats	---	---	0.05% in food	P.O.	0	All alive at 3 mos.	3 mos.
	8 rabbits	---	---	---	Skin	0	---	26-30 days
241.--α-BROMOBENZYL CYANIDE								
Visser and Ten Seldam, 1938	50 mice	---	---	1/320 normal[2] in acetone twice weekly	Skin	0	---	5 mos.
242.--CAROTENE $C_{40}H_{56}$								
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin painting	0	7 alive at 6 mos. 1 alive at 1 year	488 days
Gardner et al., 1940	6 mice	C3H	---	---	S.C.	0	All alive at 150 days	520 days
243.--CATECHOL								
Hosino, 1940b	Rabbits	---	---	Daily for 40 days	S.C. or I.V.	0	---	At least 40 days
244.--ω-CHLOROACETOPHENONE 								
Visser and Ten Seldam, 1938	50 mice	---	---	1/320 normal in acetone, twice weekly	Skin	0	---	5 mos.

1. By stomach tube

2. Substance impure

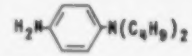
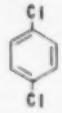
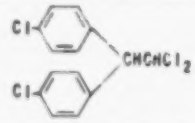
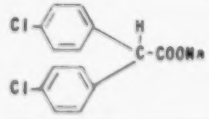
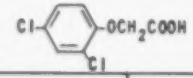
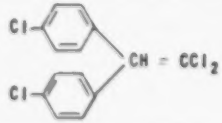
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
245.--CHLOROQUINONE 								
Takizawa, 1940c	Mice	Stock	---	0.1 or 0.25% in benzene every 1 or 2 days	Skin painting	1 pap.[1]	14 alive at 200 days	Over 200 days
Takizawa, 1940b	Mice	---	---	0.1% in benzene every 1 or 2 days	Skin	0	14 alive at 200 days	Over 200 days
246.--5-CHLORO-o-TOLUIDINE[2] 								
Berenblum and Bonser, 1957	19 rats	---	---	Vapor	Inhalation	0	---	45 weeks
247.--5-CHLORO-o-TOLUIDINE HYDROCHLORIDE[2] 								
Berenblum and Bonser, 1957	12 rabbits	---	---	1% aqueous soln., 20 cc.; average of 66 injections	I.P.	0	7 alive at 6 mos.	3 years, 8 mos.
248.--p-CRESOL 								
Reimann, 1930	6 rats --do-- 20 mice	Albino --- ---	--- --- ---	5% in alcohol 3 times weekly --do-- --do--	Skin[3] --do-- --do--	0 0 0	--- --- ---	6 weeks --do-- --do--
249.--CYCLOHEXANE								
Kennaway, 1930	Mice	---	---	---	Skin painting	0	---	---
Kennaway and Hieger, 1930	--do--	---	---	---	--do--	0	---	---
250.--CYCLOHEXENE								
Kennaway, 1930	Mice	---	---	In acetone weekly, 3 applications	Skin	0[4]	---	---

1. Similar number in benzene controls. Also 2 lung cancers
2. Crude plant quality used
3. p-Thiocresol applied simultaneously to another section of skin with no significant pathological changes
4. Substance extremely irritating

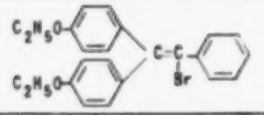
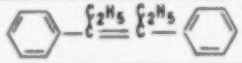
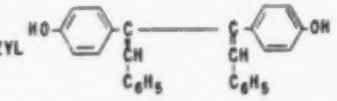
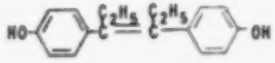
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
250.--CYCLOHEXENE (Continued)								
Kennaway and Hieger, 1930	Mice	---	---	---	Skin painting	0	---	---
Berenblum, 1935	Mice	---	---	In acetone weekly, 3 applications	Skin	0	---	1 mo.
251.--N,N'--DIACETYL-p-PHENYLENEDIAMINE 								
Sugiura et al., 1945	10 rats	Sherman	---	9.0 mg. daily, in food	P.O.	0	---	At least 700 days
252.--2,4-DIAMINODIPHENYLAMINE 								
Shear and Stewart, 1941	16 mice	A	---	One-eighth saturated soln. in glycerol, 0.1 cc. repeated injection	S.C.	0	---	15 mos.
253.--2,5-DIAMINOTOLUENE 								
Hartwell and Andervont, unpub. results	20 mice	C	F	2.5 mg. in olive oil, 8 injections	S.C.	0[1]	---	15 mos.
254.--2,5-DIAMINOTOLUENE DIHYDROCHLORIDE 								
Hartwell and Andervont, unpub. results	13 mice	C	F	1 mg. in aqueous soln. 13 injections	S.C.	0	---	12 mos.
255.--DIBENZYL 								
Boyle, 1958a	5 rats	Wistar	M	100 mg. crystals	S.C. abdominal wall	0	---	28 days
	---do---	---do---	F	---do---	---do---	0	---	---do---
Boyle, 1959b	6 rats	---do---	M & F	---do---	S.C.	0	---	4 weeks
256.--N,N'-DIBENZYL THIOUREA 								
Huter, 1967	Rabbit	---	---	250 mg. in 2 cc. olive oil daily, 3 mos.[2]	S.C.	0	---	Ca. 3 mos.

1. Liver normal

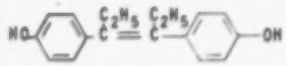
2. Also given twice a week

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
257.--N,N-DI-n-BUTYL-p-PHENYLENEDIAMINE 								
Sugiura et al., 1945	5 rats	Sherman	---	0.5 mg. daily in food	P.O.	1 pap.[1]	---	At least 546 days
258.--p-DICHLOROBENZENE 								
Parsons, 1942	6 mice[2]	Stock	---	0.4 mg. in sesame oil[3]	S.C.	0	3 died in 10 days	At least 10 days
	1 mouse	--do--	---	--do--	i.P.	1	--do--	--do--
	10 mice[4]	--do--	---	0.4 mg. in sesame oil, 9 times[3]	S.C.	1 sarc.[5]	4 died in 30 days	At least 77 days
259.--1,1-DICHLORO-2,2-bis(p-CHLOROPHENYL)-ETHANE 								
Little et al., 1947	8 rabbits	---	---	---	---	0	---	4-39 days
260.--p,p'-DICHLORODIPHENYLACETIC ACID, SODIUM SALT 								
Little et al., 1947	6 rabbits	---	---	50 mg./kg. daily	P.O.[6]	0	---	9-52 days
261.--2,4-DICHLOROPHENOXYACETIC ACID 								
Bucher, 1946	1 mouse	---	M	150-200 mg./kg.	S.C.	0	---	At least 3 mos.
262.--4,4'-DICHLOROPHENYLDICHLOROETHYLENE 								
Little et al., 1947	8 rabbits	---	---	---	---	0	---	At least 32 days

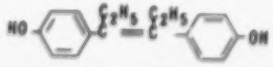
1. Of the forestomach, at 546 days
2. Irradiated
3. Along with suspension of silica in saline at the injection site
4. Non-irradiated
5. At 77 days metastases to lymph nodes and peritoneum
6. By stomach tube

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
263.--α,α-DI-(p-ETHOXYPHENYL)-β-PHENYLBROMOETHYLENE 								
Robson and Schönberg, 1942	Mice	---	F castr	100 micrograms in oil, daily	S.C.	0	---	At least 93 days
	Mice	---	-do-	500 micrograms in oil, daily	P.O.[1]	0	---	At least 38 days
264.--DIETHYLSTILBENE 								
Dodds, E.C. et al., 1941	Mice	---	---		Skin painting	0	---	6-9 mos.
265.--4,4'-DIHYDROXY-α,β-DIBENZYLIDENEDIBENZYL 								
Noble, 1939b	6 rats	Wistar	M & F	10 mg. crystals	S.C.	0	---	4 weeks
266.--4,4'-DIHYDROXY-α,β-DIETHYLSTILBENE 								
Noble, 1938	6 rats[2]	---	F castr	25 mg. in sesame oil during 31 days	S.C.	0	---	37 days
	8 rats	Wistar	F	200 mg. in sesame oil during 20 days	S.C.	0	---	23-69 days
Noble, 1938a	3 rats	--do--	M	10 mg. crystals	S.C. abdominal wall	0	---	28 days
	--do--	--do--	F	--do--	--do--	0	---	--do--
	5 rats	--do--	F	--do--	--do--	0	---	23 days
	5 rats	--do--	F	--do--	--do--	0	---	--do--
Lacassagne, 1938b	5 mice	R 3	M & F	25 micrograms in sesame oil, twice weekly	Inj.	2[3]	All dead at 139 days	139 days
Arnold, 1939	Dogs	---	M & F	4 to 10 mg. daily	I.M.	0	---	40 days
Engle and Crafts, 1939	5 monkeys	Macacus rhesus	F castr	10 to 50 mg. pellets	S.C.	0	---	85 days
Gaarenstroom and Levie, 1939	8 rats	---	---	5 micrograms in olive oil, daily	S.C.	0	---	28 days
Gardner and Allen, 1939	1 mouse	C3H	F	25 micrograms in sesame oil, weekly	S.C.	1[4]	---	279 days

1. By stomach tube
2. 2 were hypophysectomized
3. Mammary adenocarcinomas in males
4. Mammary carcinoma

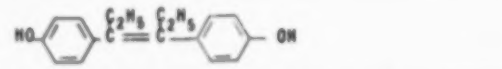
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
266.--4,4'-DIHYDROXY-α,β-DIETHYLSTILBENE (Continued) 								
Geschickter, 1959a	Rats	---	---	200 micrograms daily	---	1[1]	---	100 days
Geschickter, 1959b	Rats	---	---	100 micrograms in oil, daily	Inj.	Mammary[2] carc.	---	Over 200 days
Grumbrecht and Loeser, 1959	19 rats	---	F	1 mg. in sesame oil, daily	P.O.	0	---	45 days
Loeser, 1959	Rats	---	F	0.1 to 5 mg. in sesame oil, daily	P.O. or S.C.	0	---	Up to 2 mos.
	Guinea pigs	---	F	--do--	--do--	0	---	--do--
Noble, 1959	22 rats	Wistar	M	0.05 to 5 micrograms per cc. water	P.O.	0	---	28 days
	18 rats	--do--	F	--do--	P.O.	0	---	--do--
	Rats	--do--	M & F	5 micrograms per cc. water	P.O.	0	---	10 weeks
	4 rats	--do--	M	10 mg. crystals	S.C.	0	---	51 days
Noble,[3] 1959b	6 rats	Wistar	M & F	10 mg. crystals	S.C.	0	---	4 weeks
	5 rats	--do--	---	--do--	S.C.	0	---	--do--
	10 rats	--do--	---	--do--	S.C.	0	---	10 to 24 weeks
Tislowitz, 1959a	2 dogs	---	F	5 mg. daily	Inj.	0[3]	---	41 and 54 days
Tislowitz, 1959b	5 mice	Albino	M, castr	20 micrograms in olive oil, 4 injections	Inj.	0	---	35 days
	5 mice	--do--	-do-	100 micrograms in olive oil, 4 injections	Inj.	0	---	35 days
Cook et al., 1940a	Mice	---	---	---	Skin	0[4]	---	---
	--do--	---	---	---	S.C.	0[5]	---	---
	--do--	---	---	---	P.O.	0[6]	---	---
Freed et al., 1940	1 dog	---	---	10 mg. daily	P.O.	0	---	60 days
Gardner and Strong, 1940	7 mice	C57	M & F	250 micrograms in sesame oil weekly	S.C.	0	---	Up to 256 days
Grumbrecht and Loeser, 1940	56 rats	---	F	0.25 or 1 mg. in sesame oil daily	S.C.	0	11 died in 178 days	21-190 days
Hooker et al., 1940	Mice	A	M	250 micrograms weekly	Inj.	1[6]	---	244 days
Huf, 1940	10 rats	---	M	1 mg. daily for 14-18 days	S.C.	0	---	56 days
Lewis and Turner, C.W., 1940	4 goats	---	M, Normal and castr	0.25-0.50 mg. daily	S.C.	0	---	2-4.5 mos.

1. Mammary carcinoma
2. Average time of 200 days
3. Agranulocytosis and anemia
4. No liver lesions of 7 livers examined
5. No liver lesions of 10 livers examined
6. Of testis. No metastases

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
266.--4,4'-DIHYDROXY - α, β-DIETHYLSTILBENE (Continued) 								
Lipschütz and Vargas, 1940	Guinea pigs	---	M	100-1000 micrograms 3 times weekly	S.C.	Tumors[1]	---	Over 3 mos.
	33 guinea pigs	---	M, castr	0.1-80.0 micrograms in olive oil 3 times weekly	S.C.	19[2]	---	115 days
MacBride et al., 1940	6 human beings	---	F, castr	100 mg. pellet	S.C.	0	---	27 days to 74 mos.
Palma, 1940	5 guinea pigs	---	F, castr	80 micrograms in olive oil 3 times weekly	S.C.	2[3]	---	Not over 3 mos.
	9 guinea pigs	---	M	---do---	---do---	3[4]	---	---do---
	9 guinea pigs	---	M	320 micrograms in olive oil 3 times weekly	---do---	5[4]	---	---do---
Raral and Engelhart, 1940	29 rats	---	F, normal and castr	100-2000 units in oil every 2 days	S.C.	0	---	60-150 days
Ratschow and Steckner, 1940	20 rats	White	M & F	1 mg. in 0.5 cc. sesame oil	S.C.	0	---	55 days
Shimkin and Grady, 1940a	5 mice	C3H	F	5 mg. (total dose) in sesame oil	S.C.	3[5]	2 died early	40 weeks
	5 mice	---do---	F	1.2 mg. (total dose) in sesame oil	S.C.	5[5]	---	42 weeks
	10 mice	---do---	M	5 mg. (total dose) in sesame oil	S.C.	8[5]	---	54 weeks
	5 mice	---do---	M	1.2 mg. (total dose) in sesame oil	S.C.	1[5]	---	---do---
Shimkin and Grady, 1940b	21 mice	C3H	M	0.125 or 0.375 mg. in sesame oil, 2 times weekly for 17 weeks	P.O.	7[6]	9 died in 17 weeks	Ca. 24 weeks
Allen and Gardner, 1941	Mice	---	F	---	Inj.	Cervical cancers	---	---
Deanesly and Parkes, 1941	4 rats[7]	---	M	Pellet of avg. wt. 15.2 mg.	S.C.	0	---	96 days
	5 rats	---	M	Pellet of 15 mg.	S.C.	0	---	14 weeks
Dingemanse and Tyslowitz, 1941	3 dogs	---	F	5 mg. daily	S.C.	0	---	55 days
Dodds et al., 1941	25 mice	Colored	---	0.3% in acetone 2 times weekly	Skin painting	0	All died in 3 mos.	3 mos.
Forbes, 1941	14 rats	---	M & F	Pellets, 6-10 mg.	S.C.	0	---	At least 51 days
Gardner et al., 1941	Mice	CBA, C3H, C57, JK, A & hybrid	---	250 micrograms in oil, weekly	Inj.	0	---	At least 450 days

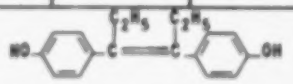
1. Uterine and extra-uterine beginning of 55 days
2. Uterine and extra-uterine, positive with dose of 3 micrograms and higher
3. Uterine
4. Genital (testicles). Also tumor dissemination especially on spleen
5. Breast tumors
6. Mammary adenocarcinomas; first in 20 weeks
7. Hypophysectomized

266.--4,4'-DIHYDROXY-α,β-DIETHYLSTILBENE (Continued)

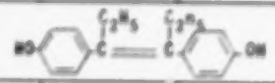


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Itoh et al., 1941	4 fowls	white leghorn	M, castr	50 mg.	S.C.	0	---	1-2 mos.
Von Haam et al., 1941	Rats	---	Normal and castr M & F	1 mg. 3 times weekly	Inj.	0	---	1 mo.
	---do---	---	M & F castr	0.1 mg. 3 times weekly	Inj.	0	---	1 mo.
Lewis et al., 1941	Rabbits	---	M	0.4-32 micrograms in oil daily for 20 days	Inj.	0	---	40-65 days
	2 rabbits	---	M	Pellets, ca. 18 mg.	---	0	---	122 days
	5 rabbits	---	---	0.02-2.0 micrograms in alcohol daily	Skin	0	---	30 days
	6 goats	---	M & F & castr normal	0.25-1 mg. daily	S.C.	0	---	96-8 mos.
Lipschütz and Vargas, Jr., 1941c	53 guinea pigs	---	F, castr	0.1 to 1000 micrograms in olive oil 3 times weekly for 6-16 weeks	Inj.	Tumors[1]	---	At least 16 weeks
Lipschütz et al., 1941g	8 guinea pigs	---	F, castr	80 micrograms in olive oil 3 times weekly	Inj.	9[2]	---	87 days
	9 guinea pigs	---	M	---do---	---do---	0[2]	---	---do---
	9 guinea pigs	---	M	320 micrograms in olive oil 3 times weekly	Inj.	1[2]	---	---do---
Matthews et al., 1941	20 rats	albstar	M	1 mg. in diluted NaOH soln. 3 times weekly	P.O.[3]	0	---	100 days
	10 rats	---do---	M	25 micrograms in sesame oil every 5 days	---do---	0	---	---do---
	10 rats	---do---	M	---do---	I.M.	0	---	---do---
Morrell and Hart, 1941a	Rats	---	F	0.5 to 50 micrograms in corn oil daily for up to 52 days	Inj.	0	---	Up to 72 days
	---do---	---	F	100 or 250 micrograms in corn oil daily for up to 90 days	---do---	0	---	Up to 113 days
	---do---	---	F, castr	0.5 to 50 micrograms in corn oil daily for up to 52 days	Inj.	0	---	72 days
	---do---	---	-do-	0.1 or 1.0 micrograms in corn oil daily for up to 190 days	Vagina	0	---	Up to 246 days
	---do---	---	-do-	500 micrograms in vanishing cream or corn oil daily, up to 190 days	Skin	0	---	---do---
Morrell and Hart, 1941b	Rats	---	F	1.25 or 2.5 mg. 3 times weekly	Inj.	0	---	150 days
Morrell and Hart, 1941c	Rats	---	M, normal & castr	1 to 250 micrograms in corn oil daily for 52-56 days	Inj.	0	---	At least up to 56 days
Page et al., 1941	46 rats	albstar	F, normal & castr	Pellets, 50 or 200 mg.	S.C.	0	---	31-116 days

1. Uterine fibroids
2. Extra-genital peritoneal fibroids
3. By stomach tube

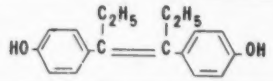
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
266.--4,4'-DIHYDROXY -α,β-DIETHYLSTILBENE (Continued) 								
Richards and Kueter, 1941	12 rats	Wistar	M & F	5 or 10 mg., daily	P.O.	0	--	60 days
	12 rats	--do--	--do-	10 or 20 mg. daily	P.O.	0	---	--do--
	16 rats	--do--	--do-	2 mg. daily	P.O.	0	---	38 days
Russell, M.K. et al., 1941	103 rats	--do--	M & F normal castr	50 micrograms to 5 mg. in diluted NaOH soln. or 40% ethyl alcohol 3 times weekly	P.O.[1]	0	---	Up to 100 days
Saunin and Prenru, 1941	10 mice	---	M & F	0.05 mg. in sesame oil, weekly	S.C.	1[2]	3 died early	5 mos.
	--do--	---	--do-	0.1 mg. in sesame oil, weekly	S.C.	0	5 alive at 3-1/2 mos	--do--
	6 mice	---	--do-	1 mg. pellet	--do--	0	---	Over 7 weeks
	8 rats	---	--do-	1 mg. pellet	--do--	0	---	56 days
	5 rabbits	---	--do-	1 mg. in oil	Under the breast	0	3 died in 4 weeks	Over 4 weeks
	2 rabbits	---	F	3 mg. pellet	S.C.	0	1 died in 3 mos.	Over 3 mos.
	10 guinea pigs	---	M & F	5 gm. as pellets	S.C.	0	All died in 45 days	45 days
Shimkin and Andervont, 1941	140 mice	C3H & C[3]	M & F	0.2 mg. in sesame oil weekly for 20 weeks or as 10-50% cholesterol pellet weighing 5-8 mg.	S.C.	Tumors[4]	---	---
Shimkin and Grady, 1941a	21 mice	C3H	M	0.125 or 0.375 mg. in sesame oil 2 times weekly for 17 weeks	P.O.	11[5]	9 died in 17 weeks	Over 26 weeks
	10 mice	C3H	M	0.2 to 0.75 mg. in sesame oil 2 times weekly for 15 weeks	P.O.	6[6]	1 died in 15 weeks	36 weeks
	30 mice	C3H	M	0.125 to 0.5 mg. in sesame oil 2 times	S.C.	(6)	13 died in 11 weeks	4 mos
Shimkin et al., 1941	191 mice	C	M & F	5-100% in cholesterol pellets (4-6 mg. pellets)	S.C.	13[5]	High mortality in 50-100% pellets	11 mos.
	20 mice	A	M	in cholesterol pellets	S.C.	2[6]	---	7 mos.
Shimkin and White, G., 1941	28 mice	A & C3H	M	Pellets in cholesterol, 10-100%, 2.5-4.1 mg.	S.C.	0	---	70 days
	16 rats	Wistar	M & F	Pellets in cholesterol, 10-100%, 4.1 8.2 mg.	S.C.	0	---	--do--
Tyslowitz and Dingemanse, 1941	10 dogs	---	M & F normal & castr	1 or 5 mg., daily injection	Inj.	0	---	Ca. 90 days
	Dogs	---	---	1 mg. daily	Inj.	0	---	9 mos.
Allen and Bern, 1942	31 guinea pigs	---	M & F	0.33 or 0.5 mg. 3 times or 6 times weekly in gelatin capsule	P.O.	0	---	7-17 weeks
Elgueta-Elgueta, 1942	11 guinea pigs	---	F, castr	40% in cholesterol, 3.5-18 micrograms per day in alcohol	S.C.	1	---	157-173 days

1. By stomach tube
2. Carcinomatous cystadenoma
3. Foster-nursed by mothers of different strains
4. Mammary
5. Of the testicle in males (62 effective total); metastases in 3 animals. Also mammary carc.; lymphoid tumors, all in both male and female
6. Of the testicle

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
266.--4,4'-DIHYDROXY -α,β-DIETHYLSTILBENE (Continued) 								
Elqueta-Elqueta, 1942	13 guinea pigs	---	F, castr	40% in cholesterol 2-12 micrograms per day in alcohol	S.C.	5	---	115-186 days
Foster, 1942	6 rats	Wistar	M & F	10 mg. tablets	S.C.	5	---	Over 16 weeks
Foster, 1942	6 rats	Immature	M & F	10 mg. tablets	Implanted	0	---	10 weeks
Geschickter and Byrnes, 1942	10 rats	---	M, normal & M & F normal & castr	100 micrograms daily	Inj.	8[1]	---	222 days
	2 rats	---	F, normal & castr	Multiple pellets	S.C.	2[2]	---	90 days
	1 rat	---	M	6 pellets, repeated in 6 mos.	S.C.	Tumors[3]	---	165 days
Griffiths and Young, 1942	20 rats	---	M	Two tablets, 15 mg. (Avg. absorption 0.26 mg. per rat per day)	S.C.	0	---	6 weeks
Hooker and Pfeiffer, 1942	47 mice	A	M	0.25 mg. in sesame oil weekly	Inj.	24[4]	32 alive at 8 mos.	Over 8 mos.
Jones, 1942	24 rats	---	M & F	50 or 100 micrograms daily	S.C.	0	---	5-1/2 mos.
Lewis and Turner, 1942	7 goats	---	F	105-565 mg. (total dose)	P.O. & S.C.	0	---	At least 1 year
	1 goat	---	M, castr	By injection for 76 days, then 71.8 mg. as pellets	S.C.	0	---	At least 151 days
	1 cow	---	F	1136 mg. (total dose)	Inj. & P.O.	0	---	Several mos.
Matthews et al., 1942a	17 rats	Wistar	M	1 mg. in dil. NaOH soln. 3 times weekly for 58 days	P.O.[5]	0	---	At least 58 days
Matthews et al., 1942b	85 rats	Wistar	F, normal & castr	250 micrograms per. cc. of 40% alc. soln. or 50 or 250 micrograms per. cc. of dil. NaOH soln. 1 cc. 3 times weekly	P.O.[5]	0	---	75 days
Shimkin and Andervont, 1942	13 mice	C3H[6]	M	0.2 mg. in sesame oil weekly, 20 weeks	S.C.	9[10]	---	15 mos.
	22 mice	C3H[7]	M	---do---	---do---	2[11]	---	---do---
	18 mice	C3H[8]	M	[illegible] cholesterol pellet weighing 4-6 mg.	---do---	10[11]	---	At least 12 mos.
	33 mice	C[9]	M	---do---	---do---	5[11,12]	---	---do---
	56 mice	---do---	F	25% or 50% cholesterol pellets	---do---	15[11]	---	---do---
	38 mice	C57, black[9]	M	---do---	---do---	0	---	---do---
	154 mice	C3H, C, & C57, black	M	10% cholesterol pellet weighing 6-8 mg.	S.C.	26[11,13]	---	16 mos.
	160 mice[13]	---do---[13]	F, castr	25% cholesterol pellet weighing 4-6 mg.	S.C.	41[11,14]	---	12 mos.

1. Mammary
2. Mammary, first at 35 days
3. Lymphosarcoma, in breast
4. Of the testicle. Also lung tumors
5. By stomach tube
6. Nursed by C3H mothers
7. Nursed by C57 black mothers
8. Nursed by own mothers or C57 black or C mothers
9. Nursed by own or C3H mothers
10. Testicular tumors. See Shimkin et al., 1941
11. Also testicular tumors
12. Mice received also estrone
13. Both fostered and non-fostered
14. Also 2 sarcomas at or near site of estrone injection possibly due to peanut oil

266.--4,4'-DIHYDROXY -α,β-DIETHYLSTILBENE (Continued)

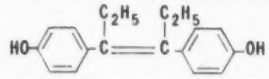


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Shimkin and Andervont, 1942	39 mice	Various hybrids	M	10% to 25% cholesterol pellets	S.C.	8[1]	---	12-15 mos.
	38 mice	C	M	10-25% of cholesterol pellets	S.C.	0[1,2]	---	--do--
Teague, 1942	16 rats	---	♂ normal & castr	50 mg. per kg. body wt. daily in olive oil	P.O.[3]	0	---	86 days
Emery, 1943	10 rats	Albino	F, castr	0.1 mg. in sesame oil daily	I.P.	0	---	50 days
	12 rats	--do--	M, castr	0.5 mg. in sesame oil every 5 days	--do--	0	---	50 days
Mansilla, 1943	87 animals[4]	---	---	3.8-23.8 mg. plus cholesterol in pellets	S.C.	19	---	70-100 days
Matthews et al., 1943	80 rats	Wistar	F, castr & M, normal	1 mg. in dil. NaOH soln. daily	P.O.[3]	0	---	100 days
Mulligan, 1943	4 dogs	Mongrel	M	330-2985 mg.	P.O.	0	---	Several mos.
Quintana et al., 1943	86 animals	---	---	7.9-14.9 micrograms	S.C.	0[5]	---	70-100 days
Gardner et al., 1944	42 mice	C3H	---	25 and 250 micrograms in sesame oil weekly	S.C.	0	---	---
Gardner and Dougherty, 1944	187 mice	C3H, A, CBA, C57, JK, PM	M & F	250 micrograms in sesame oil weekly	S.C.	Tumors[6]	--	---
	135 mice	--do--	-do-	Pellet, 25% in cholesterol	--do--	--do--	---	---
	6 mice	--do--	-do-	Pellet, 10% in cholesterol	--do--	0	---	---
Hale and Meichert, 1944	Rats	---	F	0.01 mg. daily	S.C.	Tumors[7]	---	Up to 15 mos.
Ingle, 1944	Rats	Sprague-Dawley	M	0.1 mg. once daily in sesame oil	---	0	---	At least 30 days
Kirkpatrick and Andrews, 1944	20 pheasants	Ringnecked	F	0.2 mg. daily for 20 days	Inj.	0	---	4-1/2 mos.
Lorenz, 1944	16 turkeys	---	M	3 injections 18.3-46.3 mg. pellets absorbed	S.C.	0	---	30-90 days
	17 turkeys	---	F	3 injections 24.7-41.0 mg. pellets absorbed	S.C.	0	---	--do--
Mulligan, 1944a	1 dog	Fox terrier	M	5 mg. 19% 10 mg. 2% 20 mg. for 120 days	---	Carc., Testis	---	172 days
	1 dog	Cocker spaniel	M	1790 mg. in 20 doses for 292 days	---	--do--	---	322 days

1. Mammary
2. Also testicular tumors
3. By stomach tube
4. Probably guinea pigs
5. No tumors in 70 day period. Tumors noted after 100 days
6. Lymphoid
7. Ovarian

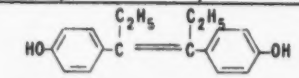
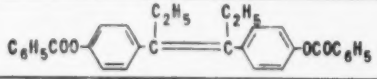
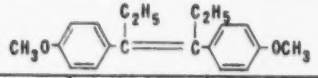
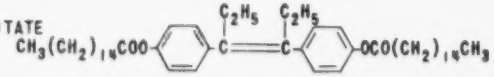
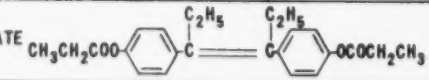
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

266.--4,4'-DIHYDROXY -α,β-DIETHYLSTILBENE (Continued)

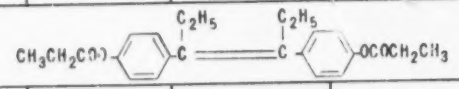
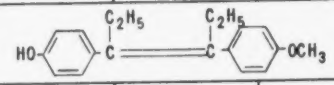
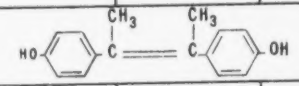
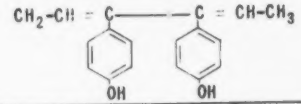
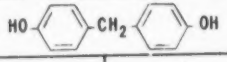


Mulligan, 1944a	1 dog	Water spaniel	---	1850 mg. 185 doses for 280 days	---	Carc., Testis	Alive at end of exp.	294 days
	--do--	Scotch collie	---	2985 mg. in 100 doses for 291 days	---	--do--	---	305 days
Nelson, 1944	127 rats	Long-Evans	M & F	50 micrograms daily	S.C.	Tumors[1]	---	At least 600 days
	29 rats	--do--	-do-	10 mg. pellets	S.C.	--do--	---	60-420 days
	53 rats	--do--	-do-	--do--	--do--	--do--	---	60-500 days
Segaloff and Segaloff, 1944	Rats	Sprague-Dawley	F	10-20 micrograms	I.P.	0	---	At least 5 weeks
	--do--	--do--	F	0.5-0.25 micrograms	S.C.	0	---	At least 5 weeks
Shimkin et al., 1944	21 mice	dba	M	Pellets (1-29 mg.)	S.C.	0	---	129 days
Vazquez-Lopez, 1944	22 hamsters	---	M & F	10 mg. tablets	S.C.	0	7 alive at 115 days	331 days
Van Wagenen and Morse, 1944	Monkeys	Rhesus	F	20-30 mg. pellets	Trocar	0	---	At least 76 days
White, F.R. and White, J., 1944	95 mice[2]	C3H	F	Pellets, 25% in cholesterol, 1.6 mg. avg. wt.[3]	---	Tumors[4]	---	17 mos.
Chu and You, 1945	10 rabbits[5]	---	F	1 mg. daily	S.C.	0	---	20-40 days
Lipschütz, et al., 1945b	47 guinea pigs	---	M, castr	40% pellets in cholesterol	S.C.	10 tumors	---	342 days
	23 guinea pigs	---	M	Pellets	S.C.	4[6]	---	16-1/2 mos.
Lorenz, F.W., 1945a	10 fowls	S.C. W.L.	M	20-25 mg. pellet	S.C.	0	---	4 weeks
	--do--	--do--	M	66-110 mg. fed per kg. body wt.	P.O.	0	---	--do--
Lorenz, F.W., 1945b	30 fowls	S.C. W.L.	M	1 pellet each week 0-11.4 mg.	Implanted	0	Sacrificed at 5 weeks	5 weeks
	20 fowls	--do--	M	1-2 pellets (6.5-12.7 mg. absorbed)	--do--	0	---	3 weeks
	16 fowls	--do--	M	1 pellet 7.1-9.1 mg. for 4 weeks	--do--	0	---	4 weeks
	6 fowls	--do--	M	2 mg.-64 mg., in food	P.O.	0	---	4 weeks
Lorenz, F.W., 1945a	10 fowls	S.C. W.L.	M	20-25 mg. fused pellet	S.C.	0	---	---
	--do--	---	M	110 mg./kg. in food	P.O.	0	---	4 weeks
	--do--	---	M	66 mg./kg. in food	--do--	0	---	4 weeks
Sykes et al., 1945	60 fowls	RI Reds,	M	1 mg. per day	P.O.	0	---	12 weeks
	27 fowls	Barred Rock	M	--do--	P.O.	0	---	12 weeks

1. Adenocarcinoma; carcinoma simplex.
2. Effective total.
3. Animals on different diets
4. Mammary; higher incidence than in controls using low cystine diets.
5. Thyroidectomized
6. Of the utricular bed.

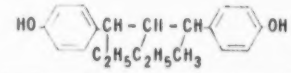
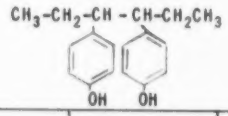
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
266.--4,4'-DIHYDROXY-α,β-DIETHYLSTILBENE (Continued) 								
Koreff et al., 1946	20 hamsters		M & F	10 mg. pellets	S.C.	0	---	3-1/2 to 8-1/2 mos.
Schönberg, A and Ghoneim, 1946	26 fowls	Egyptian races	F	0.0324 g. (total dose), 63 days	P.O.	0	All alive at 63 days	63 days
Mooley and Little, C.C., 1946	Mice	JAV	M & F	25% in cholesterol avg. wt. 4.8 mg. Pellets	S.C.	0	---	---
267.--4,4'-DIHYDROXY-α,β-DIETHYLSTILBENE DIBENZOATE 								
Emmens, 1939a	Not over 5 mice	---	F, castr	At least 20 micrograms in nut oil repeated inj.	S.C.	0	---	Ca. 44 days
Cook et al., 1940[1]	Mice	---	---	---	Skin	0[2]	---	---
	Mice	---	---	---	S.C.	0[3]	---	---
268.--4,4'-DIHYDROXY-α,β-DIETHYLSTILBENE DIMETHYL ETHER 								
Geschickter and Byrnes, 1942	Rabbits	---	---	0.5 mg. daily	Inj.	1[4]	---	615 days
	Rats	---	---	500 micrograms in oil daily	Inj.	Tumors[4]	---	233 days
Lorenz, F.W., 1945a	10 fowls	S.C.W.L.	M	66-110 mg. per kg. body weight in food	P.O.	0	---	4 weeks
269.--4,4'-DIHYDROXY-α,β-DIETHYLSTILBENE DIPALMITATE 								
Emmens, 1939a	Not over 5 mice	---	F, castr	At least 50 micrograms in nut oil repeated inj.	S.C.	0	---	Ca. 48 weeks
270.--4,4'-DIHYDROXY-α,β-DIETHYLSTILBENE DIPROPIONATE 								
Fatyol, 1939	8 mice	---	---	1 mg. in propyleneglycol twice weekly	S.C.	0	---	55 days
	10 mice	---	F	4 micrograms daily for 4 weeks, then 10 gamma daily for 4 weeks	S.C.	0	---	At least 8 weeks
Grumbrecht and Loeser, 1940	19 rats	---	F	1 mg. in sesame oil daily	S.C.	0	3 died in 169 days	190 days
Huf, 1940	10 rats	---	F	1 mg. daily for 14-48 days	S.C.	0	---	56 days
	25 rats	---	F	0.1-2 mg. daily for 13-60 days	P.O.	0	---	72 days

1. This compound called by the authors Stilboestrol Benzoate
2. [illegible] liver lesions in 9 livers examined
3. No liver lesions in 12 livers examined
4. Mammary

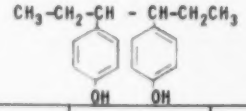
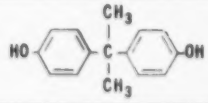
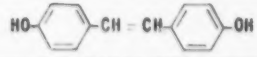
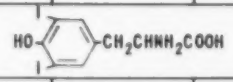
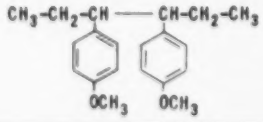
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
270.--4,4'-DIHYDROXY-α,β-DIETHYLSTILBENE DIPROPIONATE (Continued) 								
Donato, 1941	10 rats	---	---	0.02 mg. (400 u.b.i.) in sesame oil, daily	Inj.	0	---	178 days
Lipschütz et al., 1941f	41 guinea pigs	---	F, castr	0.05 to 80 micrograms in olive oil 3 times weekly	S.C.	0[1]	---	3 mos.
Walker and Stanley, 1941	2 cows	Jersey	F, castr and sterile	1560 mg. during 9 mos. and 350 mg. during 90 days, resp.	Inj.	0	---	9 mos. and 90 days, resp.
	Rats	---	F, normal and castr	0.2 mg. & 1.0 mg. daily for 20 days	Inj.	0	---	---
Lewis, A.A. and Turner, C.W., 1942	2 goats	---	M, 1 castr	2 and 3 (resp.) 100 mg. pellets	S.C.	0	---	232 and 300 days
271.--4,4'-DIHYDROXY-α,β-DIETHYLSTILBENE MONOMETHYL ETHER 								
Geschickter and Byrnes, 1942	Rats	---	---	50 micrograms in oil daily	Inj.	0[2]	---	At least 212 days
272.--4,4'-DIHYDROXY-α,β-DIMETHYLSTILBENE 								
Noble, 1939b	6 rats	Wistar	M & F	10 mg. crystals	S.C.	0	---	4 weeks
273.--4,4'-DIHYDROXY- γ,δ -DIPHENYL- β,δ -HEXADIENE 								
Noble, 1938a	3 rats	Wistar	M	10 mg. crystals	S.C. abdominal wall	0	---	28 days
	3 rats	--do--	F	--do--	--do--	0	---	--do--
Noble, 1939b	6 rats	--do--	M & F	--do--	S.C.	0	---	4 weeks
	5 rats	--do--	---	--do--	--do--	0	---	--do--
	13 rats	--do--	M & F	--do--	--do--	0	---	17 to 18 weeks
Foster, 1942	3 rats	Wistar	M & F	10 mg. tablets	S.C.	0	---	17 weeks
274.--4,4'-DIHYDROXYDIPHENYLMETHANE 								
Noble, 1939b	6 rats	Wistar	M & F	100 mg. crystals	S.C.	0	---	4 weeks

1. Uterine and extra-genital fibroids

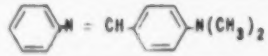
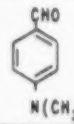
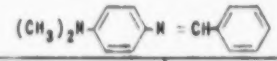
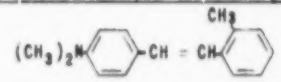
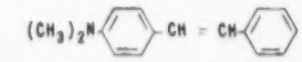
2. Mammary cancers

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
275.--2,4-DI(p-HYDROXYPHENYL)-3-ETHYLHEXANE 								
Blanchard and Stebbins, 1945	12 rats	Long-Evans	F	60 micrograms per week in oil for 70 days	S.C.	0	---	70 days
	12 rats	--do--	F	60 mg. pellets	S.C.	0	---	12 weeks
	--do--	--do--	F	300 micrograms per week for 70 days	P.O.	0	---	70 days
Stebbins and Blanchard, 1945	12 rats	Long-Evans	F	3-30 micrograms per week	Inj.	0	---	120 days
	--do--	--do--	F	3 micrograms per week	P.O.	0	---	--do--
	6 rats	--do--	F	60 micrograms per week	S.C.	0	---	--do--
	6 rats	--do--	F	300 micrograms per week	P.O.	0	---	--do--
	28 rats	--do--	F	51-61 micrograms in pellets	S.C.	0	---	16 weeks
276.-- γ,δ -DI(p-HYDROXYPHENYL)-HEXANE 								
Palma, 1940	5 guinea pigs	---	F, castr	40 micrograms in olive oil 3 times weekly	S.C.	4[1]	---	Not over 3 mos.
	10 guinea pigs	---	M	160 micrograms in olive oil 3 times weekly	S.C.	3[2]	---	--do--
	9 guinea pigs	---	M	160 micrograms in olive oil 3 times weekly	S.C.	2[2]	---	--do--
Lipschütz et al., 1941g	10 guinea pigs	---	F, castr	40 micrograms in olive oil 3 times weekly	Inj.	3	---	88 days
	5 guinea pigs	---	F, castr	80 micrograms in olive oil 3 times weekly	--do--	4[3]	---	--do--
	10 guinea pigs	---	M	40 micrograms in olive oil 3 times weekly	--do--	0[3]	---	--do--
	9 guinea pigs	---	M	160 micrograms in olive oil 3 times weekly	--do--	1[3]	---	--do--
Lipschütz et al., 1941f	49 guinea pigs	---	F, castr	0.05 to 80 micrograms in olive oil 3 times weekly	S.C.	0[3]	---	3 mos.
Dodds et al., 1941	25 mice	Colored	---	0.3% in acetone 2 times weekly	Skin painting	0	---	6-9 mos.
Griffiths, 1942	5 rabbits	---	M & F	2.5-10 mg. in arachis oil, repeated injection[4]	Inj.	0	---	10 weeks
Mansilla, 1943	49[5]	---	---	5.2-25.2 mg. plus cholesterol in pellets (0.7-4.5 mg. absorbed)	S.C.[6]	0[7]	---	70-100 days
Quintana et al., 1943	47 animals	---	---	4.7-11.0 micrograms absorbed per day	S.C.	Tumors[8]	---	--do--
Folley, 1944	14 cows	Jersey	M & F	1000 mg. tablets	Implant	0	---	At least 105 days

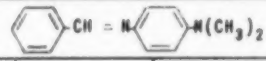
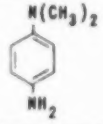
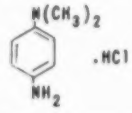
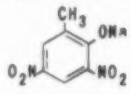
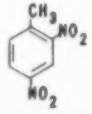
1. Uterine
2. Genital; also tumor dissemination especially on spleen
3. Extra-genital peritoneal fibroids
4. These animals also had pellets implanted
5. Probably guinea pigs
6. Some intrasplenic and some intrahepatic
7. 15 of uterus, 3 apical, 2 of spleen
8. No tumors noted until 100 days

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
276.-- γ,δ-DI(p-HYDROXYPHENYL)-HEXANE (Continued) 								
Folley, 1944	1 goat	---	F	500 mg. tablets	Implant	0	---	
	6 rabbits	---	M	250 mg. tablets	--do--	0	---	At least 38 days
	12 guinea pigs	---	M	--do--	--do--	0	---	At least 65 days
	19 pigeons	White Carneaux	---	--do--	--do--	0	---	At least 30 days
	6 rats	---	F	1000 mg. tablets	--do--	0	---	---
	8 rats	---	F	500 mg. tablets	--do--	0	---	29 days
	12 rats	---	F	250 mg. tablets	--do--	0	---	30 days
	12 rats	---	M	50 mg. tablets	--do--	0	---	--do--
	12 rats	---	F	25 mg. tablets	--do--	0	---	23 days
	12 rats	---	F	15 mg. tablets	--do--	0	---	14 days
Lipschütz et al., 1945b	11 guinea pigs	---	M, castr	Pellets, 40% in cholesterol	S.C.	1[1]	---	170 days
277.-- β,β-DI(4-HYDROXYPHENYL)-PROPANE 								
Noble, 1939b	6 rats	Wistar	M & F	100 mg. crystals	S.C.	0	---	4 weeks
278.--4,4'-DIHYDROXYSTILBENE 								
Noble, 1939b	6 rats	Wistar	M & F	100 mg. crystals	S.C.	0	---	4 weeks
Dodds et al., 1941	25 mice	Colored	---	0.3% in acetone 2 times weekly	Skin painting	0	---	6-9 mos.
279.--3,5-DIIODOTYROSINE 								
Bauer, J., 1937	Rabbits	---	---	Small doses	Inj.	0	---	Several weeks
Bauer et al., 1937	1 rabbit	---	---	0.025 mg. 40 doses	P.O.	0	---	14 weeks
280.-- γ,δ-DI(p-METHOXYPHENYL)-HEXANE 								
Lorenz, F.W., 1945a	10 fowls	---	M	110 mg./kg. in food (62 mg. consumed per week)	P.O.	0	---	4 weeks
	10 fowls	---	M	66 mg./kg. in food (37 mg. consumed per week)	P.O.	0	---	4 weeks

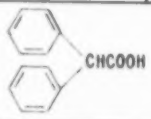
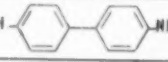
1. Of the utricular bed

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
281.--p-DIMETHYLAMINOBENZALANILINE 								
Miller and Baumann, 1945	10 rats	Albino	---	0.060% in food for 8 mos.	P.O.	0	9 alive at 10 mos.	10 mos.
282.--p-DIMETHYLAMINOBENZALDEHYDE 								
Kinosita, 1940b	Rats	---	---	In food	P.O.	0[1]	---	180 days
283.--4'-DIMETHYLAMINOBENZYLIDENEANILINE 								
Miller and Baumann, 1945	10 rats	Albino	---	0.06% for 4 mos.	P.O.	0	9 alive at 10 mos.	At least 10 mos.
Haddow et al., 1948	12 rats	Albino	---	11x5 mg. soln. in arachis oil once a week	S.C.	0	2 alive at 465 days	Ca. 465 days
	--do--	--do--	---	5x5 mg. in arachis oil, 2 week intervals	--do--	0	4 alive at 409 days	Ca. 409 days
284.--4-DIMETHYLAMINO-2'—METHYLSTILBENE 								
Haddow et al., 1948	24 rats	Albino	M & F	4x5 mg. soln. arachis oil, intervals of several weeks	S.C.	2 sarc.[2]	---	Ca. 463 days
	24 mice	Stock	M & F	8x1.25 mg. arachis oil, 2 to 3 week intervals	S.C.	0	9, 5, and 2 alive at 6, 12 and 17 mos.	Ca. 17 mos.
285.--4-DIMETHYLAMINOSTILBENE 								
Haddow et al., 1948	12 rats	Albino	---	8x5 mg. soln. arachis oil weekly	S.C.	1 sarc.[3]	---	Ca. 424-555 days
	12 rats	Albino	---	0.5 mg. per day in diet for 2 mos. then 0.25 mg. per day for 4 mos.	P.O.	10[4]	---	Ca. 555 days
	48 rats	Albino	---	6x5 mg. in arachis oil 1 to 4 weeks intervals	S.C.	4 sarc.[5]	---	Ca. 502 days
	48 mice	Stock	M & F	11x1 mg. soln. arachis oil 1-3 week intervals	S.C.	2 sarc.[6]	21, 16, 9 alive at 6, 12, 20 mos.	Ca. 20 mos.

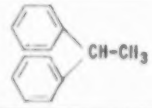
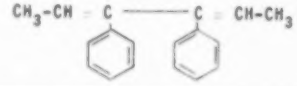
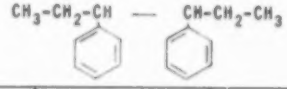
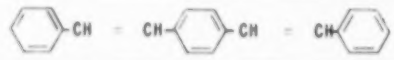
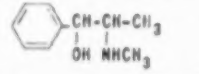
1. Slight cirrhotic change in liver
2. Also cholangioma, sarcoma of liver, mammary adenoma and ganglioneuroma of adrenal
3. Also lung adenoma, cholangioma and carcinoma of acoustic duct. Latent period 508 days
4. Carcinoma of acoustic duct, cholangioma, lung adenomas and mammary adenomas. Latent period ca. 267-424 days
5. Also fibrosarcoma, lymphosarcoma (at site) and 13 cholangiomas, carcinoma of the acoustic duct, intra-thoracic carcinoma, mammary adenoma. Latent period 214-502 days
6. Latent period 270-420 days

Referencee	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
286.--N,N-DIMETHYL-N'-BENZAL-p-PHENYLENEDIAMINE 								
Miller and Baumann, 1945	10 rats	Albino	---	0.0060% in food for 8 mos.	P.O.	0	All alive at 10 mos.	10 mos.
287.--N,N-DIMETHYL-p-PHENYLENEDIAMINE 								
Kinosita, 1936a	Rats	White	---	In olive oil	P.O.	0	---	At least 400 days
Kinosita, 1937	Rats	White	---	---	P.O.	0	---	---
Maruya, 1938	8 rats	White	M & F	0.02% in food	P.O.	0[1]	---	247 days
288.--DIMETHYL PHTHALATE SEE UNDER 1,1,1-TRICHLORO-2,2-bis(p-CHLOROPHENYL)-ETHANE, DRAIGE ET AL., 1944								
White and Edwards, 1942d	Rats	---	---	0.06% in food	P.O.	0	---	---
289.--N,N-DIMETHYL-p-PHENYLENEDIAMINE MONOHYDROCHLORIDE 								
White and Edwards, 1942a	215 rats	Osborne-Mendel	M	0.12% in food	P.O.	0	---	Ca. 140 days
290.--3,5-DINITRO-o-CRESOL, SODIUM SALT[2] 								
Ambrose, 1942	20 rats	---	M & F	Less than 20 mg./kg. body wt., daily	S.C.	0	---	30 days
	40 rats	Wistar	M	0.00078 to 0.1% in food	P.O.	0	---	105 days
	25 rats	--do--	M	0.00312 to 0.05% in food	P.O.	0	---	105 days
291.--2,4-DINITROTOLUENE 								
Clayton and Baumann, 1944	15 mice	Albino	---	0.3% in acetone three times weekly for 2 mos. Skin and 2% in acetone daily for 8 weeks		0	---	4 mos.
	Mice	Stock or C3H	---	0.1% or 0.3% in food[3]	P.O.	0	---	5 weeks
	Mice	---	---	15 mg. in hydrogenated coconut oil, 3 injections	S.C.	0	---	---

1. Changes in kidneys described
2. Also known as 4,6
3. Different diets used

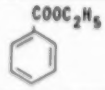
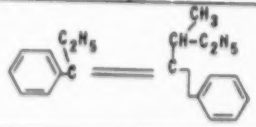
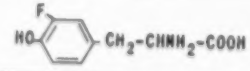
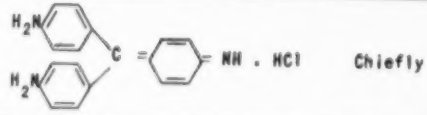
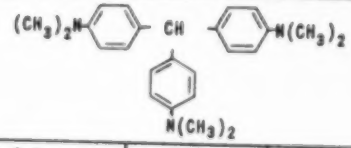
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
292.--DIPHENYL								
Bloch, 1922	Mice	---	---	---	Skin painting	---	---	---
West, H.D., 1940	6 rats	Albino	M & F	1% in food	P.O.	0	---	---
West and Jefferson, 1942	Rats	---	M & F	0.3% in food	P.O.	0	---	30 days
Deichmann et al, 1947	6 rabbits	---	---	0.3 mg. (0.14-0.45 mg.)[1] per l. of air	Inhalation	0	All lived	94 days
	10 rats	---	---	--do--	--do--	0	5 died at 49 exposures	---
	3 rabbits	---	---	0.04 mg. (0.03-0.06)[1] per l. of air	--do--	0	All lived	60 days
	6 rats	---	---	--do--	--do--	0	1 died after 29 exposures	---
	12 mice	---	---	0.005 mg. (0.002-0.008)[1] per l. of air	--do--	0	2 died after 38 and 62 exposures	62 days
	4 rats	---	---	--do--	--do--	0	---	--do--
293.--DIPHENYLACETIC ACID 								
Lillie et al., 1947	4 rabbits	---	---	30-33 doses, 50 mg./kg.	---	0	---	35-41 days
294.--DIPHENYLAMINE $(C_6H_5)_2NH$								
Yoshida et al., 1941a	Rats	White	---	Crystals in collodion	Bladder	Papillomas	---	125 days
295.--DIPHENYLBENZIDINE C_6H_5NH  NHC_6H_5								
Shear and Stewart, 1941	2 mice	Stock	F	Saturated soln. in lard, 0.25 cc. repeated injection	S.C.	0	---	26 mos.
	8 mice	A	F	--do--	--do--	0	---	--do--
	10 mice	Stock	---	--do--	--do--	0	---	--do--
	10 mice	--do--	F	Ca. 5 mg. in lard, repeated injection	--do--	0	---	--do--
296.--DIPHENYLCHLORARSINE $(C_6H_5)_2AsCl$								
Visser and Ten Seldam, 1938	50 mice	---	---	1/320 normal[2] in acetone twice weekly	Skin	1 (?) Pap.	---	5 mos.
297.--DIPHENYLCYANARSINE $(C_6H_5)_2AsCN$								
Visser and Ten Seldam, 1938	50 mice	---	---	1/320 normal in acetone twice weekly	Skin	0[3]	---	5 mos.

1. Dust composed of 50% diphenyl on celite
2. Melts at 38° to 40°
3. Two papillomas which regressed

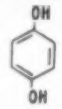
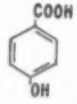
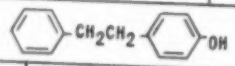
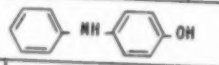
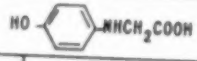
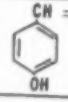
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
298.--DIPHENYLETHANE 								
Little et al., 1947	5 rabbits	---	---	21-34 doses 50 mg./kg.	---	0	---	23-39 days
299.--α,α-DIPHENYL-β-ETHYL-α-AMYLENE $(C_6H_5)_2C = \overset{C_2H_5}{C}-CH_2CH_2CH_3$								
Dodds et al., 1945	50 mice	---	M	0.3% in benzene, twice weekly	Skin	0	6 alive at 1 year	1 year
300.--α,α-DIPHENYL-β-ETHYL-α-BUTYLENE $(C_6H_5)_2C = C(C_2H_5)_2$								
Dodds et al., 1945	50 mice	---	M	0.3% in benzene, twice weekly	Skin	0	8 alive at 1 year	1 year
301.--DIPHENYLHEXADIENE 								
Dodds et al., 1941	Mice	---	---	---	Skin painting	0	---	6-9 mos.
302.--DIPHENYLHEXANE 								
Dodds et al., 1941	Mice	---	---	---	Skin painting	0	---	6-9 mos.
303.-- α,α-DIPHENYL-β-METHYL-α-PROPYLENE $(C_6H_5)_2\ C = C\ (CH_3)_2$								
Dodds et al., 1945	50 mice	---	M	0.3% in benzene, twice weekly	Skin	0	9 alive at 1 year	1 year
304.--1,4-DISTYRYLBENZENE 								
Dodds et al., 1945	50 mice	---	M	0.3% in benzene twice weekly	Skin	0	15 alive at 1 year	1 year
305.--EPHEDRINE SULFATE  $\cdot 1/2H_2SO_4$								
Davis, J.E., 1941	4 dogs[1] 4 rabbits	--- ---	--- ---	2.5-5.0 mg. per kg. body wt. daily 45 mg. daily	P.O.[2] S.C.	0 0	--- ---	48 days More than 30 days

1. Two splenectomized

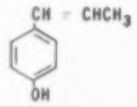
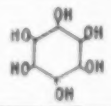
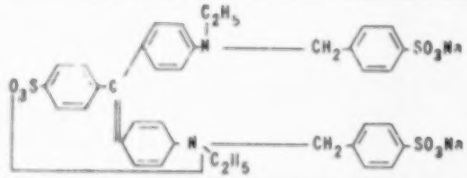
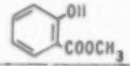
2. By stomach tube

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
306.--ETHYL BENZOATE 								
Burrows, 1936c	Mice	---	M	Twice weekly	Skin painting	0[1]	---	174 days
307.--α-ETHYL-β-sec-BUTYLSTILBENE 								
Dodds et al., 1941	25 mice	Colored	M	0.3% in benzene 2 times weekly	Skin	1 carc.	7 alive at 12 mos.	12 mos.
	25 mice	Albino	M	--do--	--do--	1 sarc.	13 alive at 15 mos.	15 mos.
Dodds, et al., 1945	100 mice	---	M	0.3% in benzene twice weekly	Skin	2 sarc.	21 alive at 1 year	1 year
308.--3-FLUORTYROSINE 								
Litzka, 1936	4 guinea pigs	---	M & F	1 mg. per kg. body wt. daily in food	P.O.	0	---	8 mos.
	Over 20 mice	---	---	1 mg. per kg. body wt. in food daily	P.O.	0	---	6 weeks
	20 mice	---	---	8 mg. per kg. body wt. in aq. soln. every 4 days	S.C.	0	---	60 days
309.--FUCHSINE  Chiefly								
Yoshida et al., 1941a	Rats	White	---	Crystals in collodion	Bladder	Pap.	125 days	
310.--GENTIAN VIOLET[2]								
Daels, 1923	Mice	---	---	Impregnated into thread	Through skin	0	---	150 days
311.--4,4',4''-HEXAMETHYLTRIAMINOTRIPHENYLMETHANE 								
Kinosita, 1940a	Rats	---	---	---	P.O.	Tumors[3]	---	---
312.--HIPPURIC ACID								
Hosino, 1940b	Rabbits	---	---	Daily for 40 days	S.C. or I.V.	0	---	At least 40 days

1. Changes in organs described
2. Mixture of pentamethyl and hexamethyl derivatives of Fuchsine
3. Gastric papillomas and adenomatous proliferation of liver

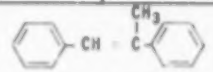
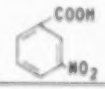
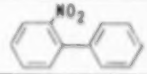
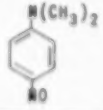
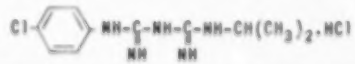
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
313.--HYDROQUINONE 								
Hosino, 1940b	Rabbits	---	---	Daily for 40 days	S.C. or I.V.	0	---	At least 40 days
314.--m-HYDROXYBENZOIC ACID								
Hosino, 1940a	Rabbits	---	---	Daily in food	S.C. or I.V.	0	---	At least 40 days
315.--p-HYDROXYBENZOIC ACID 								
Hosino, 1940a	Rabbits	---	---	Daily for 40 days	S.C. or I.V.	0	---	At least 40 days
316.--4-HYDROXYDIBENZYL 								
Noble, 1939b	6 rats	Wistar	M & F	100 mg. crystals	S.C.	0	---	4 weeks
317.--4-HYDROXYDIPHENYLAMINE 								
Shear and Stewart, 1941	10 mice 10 mice	Stock A	M & F M & F	Saturated soln. in lard, 0.25 cc. repeated injections --do--	S.C. S.C.	0 0	--- ---	19 mos. --do--
318.--4-HYDROXYPHENYLGLYCINE 								
Shear and Stewart, 1941	11 mice 12 mice 20 mice	Stock A A	M --- ---	Ca. 5 mg. crystals, repeated injections --do-- --do--	S.C. S.C. S.C.	0 0 0	--- --- ---	10 mos. 10 mos. 13 mos.
319.--p-HYDROXYPROPENYLBENZENE 								
Gomez and Turner, 1938	8 rabbits	---	F	0.1 mg. daily[1]	S.C.	0	---	25 days
Gomez and Turner, 1939	4 rabbits	---	F	2.5 mg. in alkaline soln. daily	S.C.	0	---	25 days

1. See also under estradiol

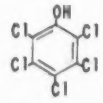
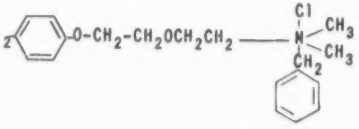
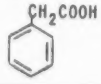
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
319.--p-HYDROXYPROPENYLBENZENE (Continued) 								
Gomez and Turner, 1939	8 rabbits	---	F	1 mg. in alk. soln. daily	S.C.	0	---	25 to 40 days
	2 rabbits	---	F, castr	--do--	S.C.	0	---	25 days
	12 rats	---	F	0.5 mg. in alk. soln., daily	S.C.	0	---	15 to 30 days
	4 mice	---	M	0.05 mg. in alk. soln., daily	S.C.	0	---	15 days
	2 mice	---	M	0.1 mg. in alk. soln., daily	S.C.	0	---	15 days
	4 mice	---	M	0.5 mg. in alk. soln., daily	S.C.	0	---	30 days
320.--4-HYDROXYSTILBENE								
Noble, 1938	6 rats	Albstar	M & F	100 mg. crystals	S.C.	0	---	4 weeks
321.--INDOPHENOL[1]								
Fischer, 1906	Rabbit	---	---	in olive oil	Ear	0[2]	---	
Berthin, 1911	Rabbits	---	---	in olive oil or rabbit fat	I.M., ear	0	---	At least 8 weeks
Akamatsu, 1920	2 foals	---	M & F	5% in lanolin	P.O.	0	---	105 and 131 days
322.--INOSITOL 								
Herrmann, G.R., 1946	36 foals	---	F	0.5 g. in food	P.O.	0	---	30-68 days
323.--LIGHT GREEN F.S. 								
Schiller, 1937	7 rats	---	---	2 to 3% aqueous soln. once or twice weekly 1 to 5 cc.	S.C.	4	---	Ca. 1 year
	Mice	---	---	---	---	0	---	---
324.--METHYL SALICYLATE 								
Burdette and Strong, 1941	36 mice	8 inbred strains		Biweekly	Skin painting	0	-28 alive at 114 days	400 days

1. There is no mention in the literature of which member or members of the class of indophenols were used.

2. Epithelial cell proliferation noted

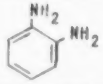
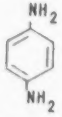
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
				325.--α-METHYLSTILBENE 				
Griffiths, 1942	3 rabbits	---	M & F	10-20 mg. in arachis oil, repeat injection	Inj.	0	---	10 weeks
				326.--NEOARSPHENAMINE				
Ebert, 1929	2 guinea pigs	---	M & F	In aqueous soln. repeated injections	Intradermal	0	---	2.5 mos.
Hvat, 1937	11 mice	---	---	0.4% suspension in lard, 0.5 cc. 3 injections	S.C.	0	---	140 days
	19 mice	---	---	0.4% suspension in lard, 0.5 cc. 1 injection	S.C.	0	---	60 days
				327.--m-NITROBENZOIC ACID 				
Nosino, 1940	Rabbits	---	---	Daily for 40 days	S.C. or I.V.	0	---	At least 40 days
				328.--o-NITRODIPHENYL 				
Deichmann et al., 1967	8 rats	---	---	50% on cellite, 0.03-0.05 mg.[1]	Inhalation	0	---	105 days
	3 rabbits	---	---	--do--	--do--	0	---	--do--
	7 rats	---	---	0.005-0.011 mg. vapor per liter of air	--do--	0	---	115 days
	8 mice	---	---	--do--	--do--	0	4 mice died	--do--
				329.--p-NITROSODIMETHYLANILINE 				
Kinosita, 1940	Rats	---	---	In food	P.O.	0[2]	---	---
				330.--PALUDRINE 				
Chen and Anderson, 1947	60 mice	---	---	23.03 mg./kg.	I.V.	0	---	Ca. 4 weeks
	20 mice	---	---	27.49 mg./kg.	P.O.	0	---	Ca. 4 weeks
	40 rats	---	---	33.10 mg./kg.	I.V.	0	---	--do--
	40 rats	---	---	58.20 mg./kg.	P.O.	0	---	--do--
	15 guinea pigs	---	---	39.51 mg./kg.	I.V.	0	---	--do--
	14 rabbits	---	---	44.85 mg./kg.	I.V.	0	---	--do--
	21 rabbits	---	---	24.30 mg./kg.	P.O.	0	---	--do--
	50 rats	---	---	0.5 and 1% solution [3]	P.O.[4]	0	---	--do--

1. Seven hours per day for 62 days.
2. Degeneration in liver cells.
3. 6-42 mg./kg. tolerated.
4. By stomach tube.

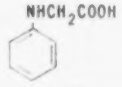
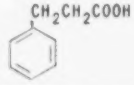
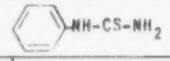
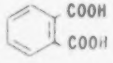
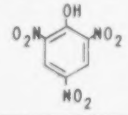
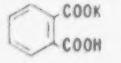
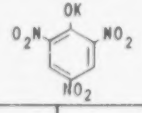
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
331.--PENTACHLOROPHENOL[1] 								
Deichman et al., 1942	20 rabbits	---	---	10-50 mgm./kg. 4% solution in stanolex fuel oil once or twice a week	Skin painting	0	---	6-61 weeks
	20 rats	Wistar	---	3.9 or 5 mg. in food daily	P.O.	0	---	26 or 28 weeks
	4 cats	Stock	---	1.25 or 2.5 mg. per kg. body wt. daily in food	P.O.	0		10 weeks
332.--PENTAPHENYLETHANE $(C_6H_5)_3C\text{-}CH(C_6H_5)_2$								
Bachmann et al., 1937	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	18 alive at 6 mos. 10 alive at 443 days	443 days
Badger et al., 1940	--do--	Stock	---	0.3% in benzene 2 times weekly	Skin	0	---	665 days
333.--PHEMEROL $(CH_3)_3C\text{-}CH_2\text{-}C(CH_3)_2$  $\text{-}O\text{-}CH_2\text{-}CH_2OCH_2CH_2$								
Teply and Elvehjem, 1944	27 rats	Sprague-Dawley	M	0.05-0.08% aqueous soln.	P.O.	0	---	5 weeks
334.--PHENYLACETIC ACID 								
Hosino, 1940a	Rabbits	---	---	Daily for 40 days	S.C. or I.V.	0	---	At least 40 days
Hosino, 1940b	Rabbits	---	---	--do--	--do--	0	---	--do--

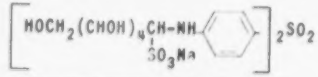
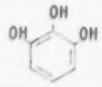
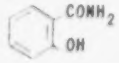
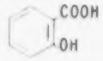
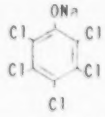
1. See also Sodium pentachlorophenate

2. The solution was allowed to remain on the skin for 30 minutes and in 3 others for 1 hr., after which the compound was washed off with soap and water. No fatalities

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
335.--dl-PHENYLALANINE								
Shear and Stewart, 1941	6 mice	Stock	M	Ca. 5 mg. crystals, repeated injection	S.C.	0	---	13.5 mos.
	10 mice	Stock	---	--do--	S.C.	0	---	--do--
336.--m-PHENYLENEDIAMINE								
Yoshida et al., 1941a	Rats	White	---	Crystals in collodion	S.C. bladder	Pap.[1]	---	125 days
337.--o-PHENYLENEDIAMINE 								
Shear and Stewart, 1941	6 mice	Stock	F	Saturated soln. in lard, 0.25 cc. repeated injection	S.C.	0	---	19 mos.
	9 mice	Stock	M	--do--	--do--	0[2]	---	--do--
Yoshida et al., 1941a	Rats	White	---	Crystals in collodion	Bladder	Pap.[1]	---	125 days
338.--p-PHENYLENEDIAMINE 								
Kinosita, 1936a	Rats	---	---	In olive oil	P.O.	0	---	At least 400 days
Risi, 1937	Rabbits[3]	---	---	1.9% aqueous soln.[4] weekly	Fur and skin of abdomen	0	---	6 mos.
Maruya, 1938	7 rats	White	M & F	0.02% in food	P.O.	0[5]	---	333 days
Takizawa, 1940c	Mice	Stock	---	0.1 or 0.25% in benzene every 1 or 2 days	Skin painting	0	9 alive at 200 days	Over 200 days
Takizawa, 1940b	Mice	---	---	0.1% in benzene every 1 or 2 days	Skin	0	9 alive at 200 days	Over 200 days
Yoshida et al., 1941a	Rats	White	---	Crystals in collodion	Bladder	Pap.[1]	---	125 days

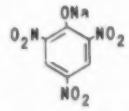
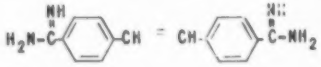
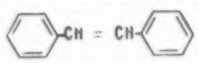
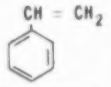
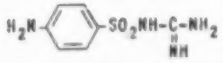
1. Also infiltrative atypical proliferation in the deeper layer of the epithelium
2. In 1 animal hepatomas and cirrhosis of the liver
3. Subcutaneous injections into guinea pigs caused death in 5 days
4. Containing also hydrogen peroxide
5. Changes in kidney described

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
				339.--PHENYLGLYCINE 				
Shear and Stewart, 1941	14 mice	Stock	---	2.5 mg. suspended in lard, repeated injection	S.C.	0	---	19 mos.
	21 mice	A	M & F	10 mg. in lard, repeated injection	S.C.	0	---	--do--
				340.--PHENYLISOCROTONIC ACID $C_6H_5CH = CHCH_2COOH$				
Kennaway, 1930	Mice	---	---	In benzene	Skin painting	0	---	---
				341.--PHENYLPROPIONIC ACID 				
Hosino, 1940b	Rabbits	---	---	Daily for 40 days	S.C. or I.V.	0	---	At least 40 days
				342.--PHENYLTHIOCARBAMIDE 				
Richter and Ellisby, 1941	23 rats	---	---	0.001% to 0.1% in water	P.O.	0	---	41-125 days
Richter and Ellisby, 1942	26 rats	---	M & F	0.1-0.10% in water or food every 10 days	P.O.	0	3 died early	80 days
Dickx, 1947	5 rats	Black Norway	M & F	25-40 mg. daily in food	P.O.	0	All died at 81 days	82 days
				343.--PHTHALIC ACID 				
Hosino, 1940a	Rabbits	---	---	Daily for 40 days	S.C. or I.V.	0	---	At least 40 days
				344.--PICRIC ACID 				
Daels, 1923	Mice	---	---	Impregnated into thread	Through skin	0	---	150 days
				345.--POTASSIUM ACID PHTHALATE  (See under Hydrochloric acid, Suntzeff et al., 1940)				
				346.--POTASSIUM PICRATE 				
Meyl, 1892	1 rabbit	---	---	0.06 g. daily	P.O.	0	---	90 days

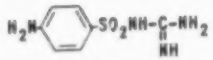
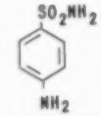
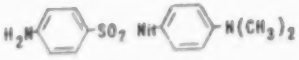
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
347.--PROMIN 								
Smith et al., 1945	20 guinea pigs	---	M	0.5 g. per kg. body weight, daily	P.O.	0	---	110 days
348.--PYROGALLOL 								
Risi 1937	Rabbits[1]	---	---	5% aqueous soln. weekly	Skin	0	---	---
Orr, 1938	Mice	---	---	20% in acetone weekly	Skin	0	---	---
Hosino, 1940b	Rabbits	---	---	Daily for 40 days	S.C. or I.V.	0	---	At least 40 days
349.--SALICYLAMIDE 								
Ichniowski and Hueper, 1946	50 rats	---	M & F	5-200 mg./kg. 5 times weekly for 13 weeks in suspension in aq. gum tragacanth	P.O.	0	---	20 weeks
350.--SALICYLIC ACID 								
Hosino, 1940a	Rabbits	---	---	Daily for 40 days	S.C. or I.V.	0	---	At least 40 days
351.--SODIUM BENZOATE								
White, A., 1941	106 rats	---	M	5% in food	P.O.	0	---	23 weeks
352.--SODIUM PENTACHLOROPHENATE[2] 								
Deichmann et al., 1942	2 rabbits	---	---	2016 and 111 mg. per kg. body wt. resp. in water (total dose)	Skin	0	---	32 days, 42 days, resp.
	6 rabbits	---	---	Ca. 40 mg. per kg. body wt. in water daily	Skin	0	All alive at 100 days	100 days
	23 rabbits	---	---	Ca. 3 mg. per kg. body wt. in water daily	P.O.	0	Some died from accidents	140 days
	5 rabbits	---	---	55-600 mg. per kg. body wt. in water daily for 54 days	P.O.	0	---	39 days

1. Subcutaneous injections into guinea pigs caused death in 6 days

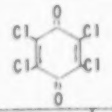
2. See also pentachlorophenol

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
353.--SODIUM PICRATE 								
Weyl, 1892	1 dog	---	---	10.5 g. (total dose)[1] in food, during 30 days	P.O.[2]	0	---	30 days
354.--STILBAMIDINE 								
Seager and Casteinuovo, 1947	160 rabbits	---	---	10-100 mg./kg. one to several inj.	S.C.	0[3]	---	At least 7 mos.
355.--STILBENE 								
Noble, 1939b	6 rats	Wistar	M & F	100 mg. crystals	S.C.	0	---	4 weeks
Schönberg and Ghoneim, 1946	26 fowls	2 Egyptian races	F	0.8500 g. (total dose) for 38 days	P.O.	0	All alive at 38 days	38 days
356.--STYRENE 								
Kennaway, 1930	Mice	---	---	---	Skin painting	0	---	---
357.--SULFAGUANIDINE 								
Ashburn et al., 1942	Rats	---	---	1% in food	P.O.	0	---	---
Daft et al., 1942a	Rats	---	---	1% in diet	P.O.	0	---	62-192 days
Daft et al., 1942b	30 rats	---	---	1% in food	P.O.	0	High mortality	Ca. 2 mos.
Spicer et al., 1942	Rats	---	---	1% in food	P.O.	0	---	Up to 161 days
Harris and Kohn, 1943	21 rats	White Vanderbilt	M & F	1% in food	P.O.	0	---	44-77 days
Gross et al., 1944	60 rats	Sprague-Dawley	---	1% in food	P.O.	0	---	At least 5 mos.
	48 rats	--do--	---	0.5% in food	P.O.	0	---	--do--
Kornberg et al., 1944	9 rats	Wistar	---	1% in food	P.O.	0	---	At least 10 weeks

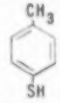
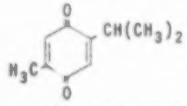
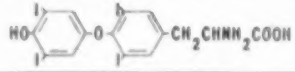
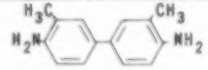
1. Of which a small part was potassium picrate
2. A small part also given subcutaneously
3. Affected liver and kidneys

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
357.--SULFAGUANIDINE (Continued) 								
MacKenzie, J.B. and MacKenzie, C.G., 1944	34 rats	---	M & F	2% in food for 140 days	P.O.	0	---	At least 200 days
358.--SULFANILAMIDE 								
Lewis, 1938b	Mice	C57 and C3H	---	12.5 - 25 mg. in olive oil suspension[1]	S.C.	0	---	300 days
McNaught et al., 1939	4 rats	Wistar	---	0.96 (avg.) g. daily in food	P.O.	0	---	6 weeks
Weatherby and Williams, 1939	2 dogs	Mongrel	F	9% in 70% diethylene glycol in water, 7.5 cc. daily	P.O.	0	All died	18 days
	3 dogs	---do---	F	9% in mucilage of acacia, 7.5 cc. daily	P.O.	0	---	18 days
	4 rats	Wistar	M	9% in 70% aqueous diethylene glycol; 7.5 cc. daily	P.O.	0	---	41 days
	5 rats	---do---	M	9% in mucilage of acacia, 7.5 cc. daily	P.O.	0	---	44 days
Zamecnik and Koletsky, 1939	52 mice	dba	M	40 to 60 mg. in olive oil suspension every 2 or 3 weeks for 4.5 mos.	S.C.	0	23 alive at 1 year	1 year
Haerem, 1940	20 mice	Swiss	---	15 mg. in lard, twice	S.C.	2 sarc	---	At least 261 days
	20 mice	Swiss	---	2-1/2% in food	P.O.	0	---	---
Richardson, 1940	78 mice	---	---	1 and 2% in food	P.O.	3[2]	---	Up to 3 mos.
Smith, 1940	Rats	---	---	700 mg. per kg. body wt. in 2% acacia suspension daily	P.O.	0	---	30 days
Haerem, 1941	20 mice	Swiss	---	15 mg. in lard	inj.	2 sarc	---	262 days
	10 rats	Stock albino	---	15 mg. in lard, twice	inj.	2 sarc	---	13 mos.
	Rats	---	---	2.5% in food	P.O.	0	---	16 mos.
Krems et al., 1941	Rats	Albino	M	0.4 g. per kg. body wt. in suspension in aqueous soln. twice daily	I.P.	0	---	2-6 weeks
Harris and Kahn, 1943	14 rats	Vanderbilt	M & F	1% in food	P.O.	0	---	44-77 days
Kornberg et al., 1944	6 rats	Wistar	---	1% in food	P.O.	0	---	At least 10 weeks
359.--p-SULFANILYLAMIDO-DIMETHYLANILINE 								
Sugiura et al., 1945	5 rats	Sherman	---	6.5 mgm. daily	P.O.	0	---	At least 700 days

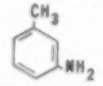
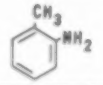
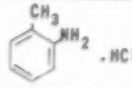
1. 25 mice survived first injection and received second dose
2. Blood changes noted

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
360.--TETRACHLORO-p-BENZOQUINONE 								
Mohavak et al., 1947	20 rats	---	M & F	10% aqueous suspension, 0.015-0.026 mgm. Multiple injections every other day	I.P.	0	---	5-17 weeks
	12 rats	---	--do--	10% aq. suspension 50 mgm./100 gm. body wt.	S.C.	0	---	7 weeks
	16 rats	---	---	2-10% in food	P.O.	0	---	67 days
	57 rats	---	M & F	3 gm./kg. in food, undiluted cotton seed	P.O.	0	---	42 days
361.--TETRAMETHYL-p,p'-DIAMINOBENZOPHENONE $(CH_3)_2N-C_6H_4-CO-C_6H_4-N(CH_3)_2$								
Harada, M., 1956a	Rats	---	---	In food	P.O.	Pap.[1,2]	---	At least 257 days
Kinosita, 1956a	Rats	White	---	In olive oil	P.O.	0	---	At least 400 days
Harada, M., 1957	Rats (?)	---	---	---	P.O.(?)	Pap.[3]	---	At least 400 days
Kinosita, 1957	Rats	---	---	---	P.O.	Pap.[3]	---	At least 257 days
Shabad, 1965	Mice	---	---	---	---	0	---	---
362.--TETRAMETHYL-p,p'-DIAMINODIPHENYLMETHANE $(CH_3)_2N-C_6H_4-CH_2-C_6H_4-N(CH_3)_2$								
Kinosita, 1957	Rats	---	---	---	P.O.	0	---	---
363.--TETRAMETHYL-p,p'-DIAMINOTRIPHENYLMETHANE $(CH_3)_2N-C_6H_4-CH(C_6H_5)-C_6H_4-N(CH_3)_2$								
Kinosita, 1957	Rats	---	---	---	P.O.	0	---	---
364.--TETRAPHENYLMETHANE $(C_6H_5)_4C$								
Morton et al., 1935	25 mice	---	---	0.5% in benzene twice weekly	Skin painting	8 epi.	---	1 year
Morton et al., 1936	25 mice	C57	---	0.5% in benzene twice weekly[4]	Skin painting	6 epi. 2 pap.	---	351 days
	Mice	A	---	---	---	0	---	--do--
Bachmann et al., 1937	20 mice	Stock	---	0.5% in benzene twice weekly	Skin painting	0	14 alive at 6 mos. 5 alive at 561 days	561 days
	20 mice	Stock	---	---	S.C.	0	4 alive at 1 year	1 year
Badger et al., 1940	20 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	---	666 days
	--do--	Stock	---	5 mg. in sesame oil, repeated injections	S.C.	0	---	826 days

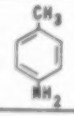
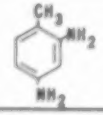
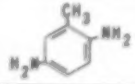
1. Of the stomach
2. Precancerous or already advanced cancerous changes in the liver
3. Of stomach; also tumorous changes in liver
4. Melts at 281.5°-282°

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
365.--p-THIOCRESOL 								
Reimann, 1950	6 rats	Albino	---	3% in alcohol 3 times weekly	Skin[1]	0[2]	---	6 weeks
	--do--	--do--	---	--do--	--do--	0	---	6 weeks
	10 mice	---	---	--do--	--do--	0	---	--do--
366.--THYMOQUINONE 								
Takizawa, 1940b	Mice	---	---	0.25% in benzene every 1 or 2 days	Skin	1 pap.[3]	28 alive at 200 days	Over 200 days
Takizawa, 1940c	Mice	Stock	---	0.1 or 0.25% in benzene every 1 or 2 days	Skin	--do--	--do--	--do--
367.--THYROXINE 								
Bauer et al., 1936	Rabbits	---	---	Small doses	Inj.	0	---	6-8 weeks
Bauer, J., 1937	--do--	---	---	--do--	Inj.	0	---	Several weeks
Bauer et al., 1937	5 rabbits	---	M & F	0.5 mg. every few days	S.C.	0	---	2 to 5 mos.
368.--o-TOLIDINE 								
Maruya, 1937a	Rats	---	---	In food	P.O.	0	---	---
Maruya, 1937b	Rats	White	---	In food	P.O.	0[4]	---	At least 200 days
Maruya, 1938	9 rats	--do--	M & F	0.1% in food	P.O.	0[5]	---	111 days
369.--TOLUENE								
Kennaway, 1924a	Several hundred mice	---	---	---	Skin painting	0	---	9 mos.
370.--m-TOLUIDINE								
Strömbeck, 1946	Rats	---	---	---	P.O.	0[6]	---	100 days

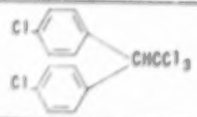
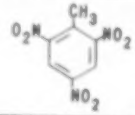
1. p-Cresol applied simultaneously to another section of skin, with no significant pathological changes
2. Epithelial cell proliferation
3. But similar number in benzene controls
4. Changes in liver and kidneys
5. Changes in liver described
6. Epithelial changes in the mucous membrane of the bladder

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
370.--m-TOLUIDINE (Continued) 								
Ekman and Strömbeck, 1947	9 rats	---	---	---	P.O.	0[1]	---	Ca. 94 days
371.--o-TOLUIDINE 								
Stoeber, 1909	Rabbit	---	---	In olive oil	S.C. ear	0[2]	---	---
Morigami and Nisimura, 1940	15 rabbits	---	---	2% in olive oil, 1 cc. daily	S.C.	0[3]	High early mortality	16 mos.
	10 guinea pigs	---	---	2% in olive oil, 0.5 cc. daily	--do--	0	--do--	---
	Rats	---	---	0.5% in $CHCl_3$ every 2 days	Skin	0[3]	--do--	---
Satani et al., 1941	5 rabbits	---	---	In olive oil or alcohol	S.C.	9 pap.	---	---
	8 guinea pigs	---	---	--do--	S.C.	--do--	---	---
	White rats	---	---	--do--	S.C.	--do--	---	---
	2 rabbits	---	---	--do--	Bladder	1 pap.	---	---
	2 rats	White	---	In ether	Skin	2 pap.	---	---
Shear and Stewart, 1941	16 mice	Stock	---	5% in lard, 0.25 cc. repeated injection	S.C.	Pap.[4]	---	20 mos.
	5 mice	A	---	--do--	S.C.	--do--	---	--do--
Yoshida et al., 1941a	Rats	White	---	Crystals in collodion	Bladder	Pap.	---	125 days
Strömbeck, 1946	Rats	---	---	---	P.O.	0[5]	---	100 days
Ekman and Strömbeck, 1947	10 rats	---	---	---	P.O.	0[5]	---	Ca. 91 days
Hartwell and Andervont, unpub. results	20 mice	C	F	10 mg. in olive oil, 8 injections	S.C.	0	---	15 mos.
372.--o-TOLUIDINE HYDROCHLORIDE 								
Hartwell and Andervont, unpub. results	11 mice	C	F	4 mg. in aq. soln. 13 injections	S.C.	0	---	12 mos.

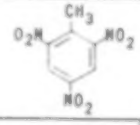
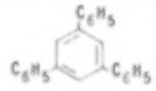
1. 6 with some changes as in o-Toluidine
2. Very toxic
3. Bladder papillomas
4. Of the ureter and kidney pelvis
5. Epithelial changes in the mucous membrane of the bladder

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
373.--p-TOLUIDINE 								
Stember, 1909	Rabbit	---	---	In olive oil	S.C., ear	0[1]	---	---
Benichin, 1911	Rabbits	---	---	In olive oil or rabbit fat	I.M., ear	0	---	At least 8 weeks
Shear and Stewart, 1941	10 mice	Stock	---	0.25% in glycerol, 0.1 cc. repeated injection	S.C.	0	---	19 mos.
374.--TOLUIDINE[2]								
Jaffé, 1920	3 mice	---	---	Vapors	Inhalation	0	Majority alive at 6 mos.	Over 1 year
	3 rats	---	---	--do--	--do--	0	--do--	--do--
	3 rabbits	---	---	--do--	--do--	0	--do--	--do--
Maruya, 1937	Rats	---	---	---	P.O.	0	---	---
375.--m-TOLUYLENEDIAMINE 								
Kinosita, 1936	Rats	White	---	In olive oil	P.O.	0	---	At least 400 days
Maruya, 1937	--do--	---	---	In food	P.O.	0[3]	---	---
Nagata, 1937	--do--	---	---	0.1% in food	P.O.	2[4]	---	At least 24 weeks
Watanabe, 1937	41 mice	---	---	2 to 3.6 mg. (total dose) in water	Inj.	0	---	At least 6 weeks
	13 rats	---	---	0.17 gm. in food daily	P.O.	3[5]	---	223 days
	10 mice	---	---	0.027 gm. in food daily	P.O.	0[6]	---	224 days
Yoshida et al., 1941a	Rats	White	---	Crystals in collodion	Bladder	Pap.	---	125 days
376.--p-TOLUYLENEDIAMINE 								
Yoshida et al., 1941a	Rats	White	---	Crystals in collodion	Bladder	Pap.	---	125 days

1. A typical epithelial cell proliferation noted
2. Specific isomer not stated
3. Slight proliferation of the bile duct epithelium
4. Malignant liver adenomas after 89 days; liver cirrhosis after 60 days; after 80 days carcinomatous growths of the bile duct
5. Possible adenomas of the bile duct; also liver cirrhosis
6. Liver cirrhosis

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
377.--1,1,1,-TRICHLORO-2,2-bis(p-CHLOROPHENYL)-ETHANE 								
Draize et al., 1944	Rabbits	---	---	10% in dimethyl phthalate 3.9,6.5,9.4 mg./kg.	S.C.	0	---	---
	Rabbits, rats and guinea-pigs	---	---	50% in dimethyl phthalate 0.5,1.0,2.0,4.0 mg./kg.	---do---	0	---	13 weeks
	---do---	---	---	In corn oil[1]	P.O.	0	---	---
	---do---	---	---	500-1000 p.p.m. in food	P.O.	0	---	---
	Rats	---	---	200,400,800 p.p.m.	P.O.	0	---	---
	Dogs	---	---	10,50,100 mg./kg. per day in corn oil	P.O.	0	---	50 weeks
								50 weeks
Smith and Stohlman, 1944	2 rabbits	---	---	25 mg./kg. in olive oil daily	P.O.	0	---	33-36 days
Reynolds et al., 1946	6 dogs	Mongrels	M & F	150-550 mg./kg. in peanut oil daily[2]	P.O.[3]	0	1 alive at 110 days	At least 110 days
Fitzhugh et al., 1947	24 rats	Osborne-Mendel	M & F	0-800 p.p.m. in 10% corn oil	P.O.	Tumors[4]	---	3-12 mos.
Little et al., 1947	11 rabbits	---	---	200 mg-1.6 gm./kg.	---	0	---	2-38 days
	10 rats	---	---	0.02% - 0.1% in food	P.O.	0	---	1 year
	10 cats	---	---	5-50 mg./kg. daily	P.O.	0	---	18-66 days
	1 rabbit	---	---	9 doses, 25 mg./kg.	P.O.[3]	0	---	13-83 days
	---do---	---	---	400 mg./kg.	---do---	0	---	---do---
	---do---	---	---	40 doses of 50/kg. = 2 g. per kg.	---do---	0	---	---do---
	---do---	---	---	7 doses then 50 days rest then 13 doses of 100 mg./kg.	---do---	0	---	---do---
	---do---	---	---	19 doses of 100 mg. at single doses	---do---	0	---	---do---
	---do---	---	---	1 with 2 doses of 400 and 500 mg. per kg.	---do---	0	---	---do---
Marsden and Bird 1947	50 turkeys	---	M & F	0.019%-0.15% in peanut oil	P.O.	0	---	At least 8 weeks
378.--2,4,6-TRINITROTOLUENE 								
Himsworth and Glynn, 1942	Rats	Wistar	---	0.15 g. per kg. body weight per day	P.O.	0[5]	---	120 days
Vetting, 1943	Guinea pigs	---	---	1 cc. per kg. daily	S.C.	0	---	9-12 mos.
	---do---	---	---	2 cc. per kg. daily	---do---	0	---	---do---
	---do---	---	---	4 cc. per kg. in three days	---do---	0	---	---do---

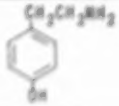
1. For rats, 200 mg./kg.; guinea pigs, 400 mg./kg.; mice 400 mg./kg.
2. Few on 600-800 p.p.m. dry DDT for comparison
3. By stomach tube
4. Few rats showed tumors (probably adenomas)
5. Hepatic lesions

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
378.--2,4,6-TRINITROTOLUENE (Continued) 								
Velling, 1943	Guinea pigs	---	---	10 cc. per kg. in 10 days	S.C.	0	---	9-12 mos.
von Oettingen et al., 1944	6 dogs	---	---	25 mg./kg.-50 mg./kg., 5 days per week	Insufflation	0	4 alive at 17 weeks	17 weeks
	8 dogs	---	F	5 mg.-100 mg. in food per day, 6 days a week for 4 weeks	P.O.	0	All alive at 4 weeks	4 weeks
	Dogs	Mongrel	F	50 mg./kg. per day in food	P.O.	0	---	12 weeks
379.--s-TRIPHENYLBENZENE 								
Bachmann et al., 1937	20 mice	Stock	---	0.5% in benzene twice daily	Skin painting	0	1 alive at 6 mos. 10 alive at 554 days	554 days
	20 mice	Stock	---	---	S.C.	0	8 alive at 571 days	---
Morton et al., 1935	60 mice	Inbred	---	5% in sesame oil, 1 cc. weekly	S.C.	12	---	1 year
Morton et al., 1936	60 mice	A	---	0.5%[1] 0.2 cc. weekly	S.C.	12	All alive at 60 days	250 days
	Mice	A	---	0.5% in benzene	Skin painting	0	---	Short period
Shear, 1938a	20 mice	A	M & F	10 mg. crystals[2]	S.C.	0	4 alive at 18 mos.	18 mos.
	Mice	Inbred	---	---	---	0	---	20 mos.
Badger et al., 1940	20 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	---	659 days
	20 mice	Stock	---	5 mg. in sesame oil, repeated injections	S.C.	0	---	645 days
Cook et al., 1940a	Mice	---	---	---	S.C.	0[3]	---	---
380.-- α,α,β-TRIPHENYL-α-BUTYLENE $(C_6H_5)_2C=\overset{C_2H_5}{\overset{|}{C}}-C_6H_5$								
Douds et al., 1945	50 mice	M	M	0.5% in benzene twice weekly	Skin	0	19 alive at 1 year	1 year
381.--TRIPHENYLCARBINOL $(C_6H_5)_3COH$								
Noble, 1939b	6 rats	Albar	M & F	100 mg. crystals	S.C.	0	---	4 weeks
382.--TRIPHENYLCHLORETHYLENE $(C_6H_5)_2C=CClC_6H_5$								
Robson et al., 1936	Mice	M	F	125 gamma in oil twice daily for 2 days	S.C.	0	---	Over 130 days

1. Melts at 169.5°-170°
2. Substance purified for atomic weight investigation
3. No liver lesions in two livers examined

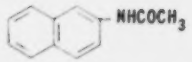
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
382.--TRIPHENYLCHLORETHYLENE (Continued) $(C_6H_5)_2C = CClC_6H_5$								
Schönberg and Ghoneim, 1946	26 fowls	2 Egyptian races	F	0.0324 g. (total dose) 63 days	P.O.	0	All alive at 63 days	63 days
383.--TRIPHENYLETHYLENE $(C_6H_5)_2C = CHC_6H_5$								
Noble, 1938a	5 rats	Wistar	M	100 mg. crystals	S.C. abdominal wall	0	---	28 days
	--do--	--do--	F	--do--	--do--	0	---	--do--
Robson and Bonser, 1939	55 mice	B !!!	M	5 and 3 mg. in oil weekly	S.C.	9[1]	26 alive at 28 weeks	At least 28 weeks
MacDonald and Robson, 1939	46 mice	---	---	0.04 to 0.5 g. in sesame oil, repeated inj.	Inj.	0	---	Over 14 days
	5 guinea pigs	---	---	20 mg. in sesame oil twice daily	---	0	---	--do--
Noble, 1939b	6 rats	Wistar	M & F	100 mg. crystals	S.C.	0	---	4 weeks
Badger et al., 1940	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	---	517 days
	--do--	Stock	---	5 mg. in sesame oil, repeated injections	S.C.	0	---	523 days
Bonser and Robson, 1940	30 mice	B !!!	M	5 mg. in oil weekly	S.C.	15[2]	---	89 weeks
	25 mice	Strong A	M	--do--	--do--	0[3]	---	--do--
	20 mice	CBA	M	--do--	--do--	0	---	--do--
Cook et al., 1940a	Mice	---	---	0.3% in benzene twice weekly	Skin	0[4]	---	---
	Mice	---	---	5 mg. in sesame oil	S.C.	0[5]	---	---
Allen and Gardner, 1941	Mice	---	F	---	Inj.	Cervical cancers	---	---
Bonser, 1942	10 mice	A	M	5 mg. in sesame oil weekly	S.C.	8[6]	8 alive at 50 weeks	75 weeks
Gardner, 1943	Mice	JR	M	5 mg. in sesame oil weekly	S.C.	7[7]	13 alive at 200 days	398 days
	17 mice	A	M	2.5 or 5 mg. in sesame oil weekly	S.C.	8[8]	---	403 days
	14 mice	C3H	M	--do--	--do--	1[9]	---	652 days
	6 mice	C_{57}l	M	--do--	--do--	0	---	338 days
	5 mice	CBA	M	--do--	--do--	0[10]	---	Ca. 700 days
	3 mice	N	M	--do--	--do--	0	---	586 days
Perry et al., 1943	Mice	C3H	M & F	5 mg. in sesame oil weekly	S.C.	Tumors[11]	---	At least 60 weeks
Bonser, 1944	59 mice	Kreyberg white label	M	5 mg. in sesame oil weekly	S.C.	1 carc.[12]	---	At least 99 weeks

1. Mammary carcinomas first in 16 weeks
2. Mammary carcinomas first at 20-29 weeks
3. No mammary carcinomas but 13 with testicular tumors, beginning at 50 weeks
4. No liver changes out of 4 livers examined
5. Possible cholangiomatous growth out of 7 livers examined
6. Testicular carcinomas also adenomas. Metastases
7. Of the testis
8. Of the testis; also 1 with mammary adenocarcinoma
9. Of the testis; also 10 with mammary adenocarcinomas
10. But one with mammary adenocarcinoma
11. Mammary carcinoma between 25 and 60 weeks
12. Of the testis; also mammary carcinoma

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
303.--TRIPHENYLETHYLENE (Continued) $(C_6H_5)_2C = CHC_6H_5$								
Bonser, 1944	20 mice	IFS	M	5 mg. in sesame oil weekly	S.C.	2 carc.[1]	---	At least 99 weeks
	24 mice	R III	M	---do---	---do---	0	---	---do---
	47 mice	R III[2]	M	---do---	---do---	9 carc.[1]	---	---do---
	16 mice	R III[3]	M	---do---	---do---	5 carc.[1]	---	---do---
	56 mice	CBA	M	---do---	---do---	0	---	---do---
	26 mice	---do---[4]	M	---do---	---do---	0	---	---do---
	51 mice	Strong A	M	---do---	---do---	18 carc.[1]	---	---do---
	9 mice	Strong A[5]	M	---do---	---do---	8 carc.[1]	---	---do---
	16 mice	Strong A	M, castr	---do---	---do---	---	---	At least 89 weeks
Gardner et al., 1944	20 mice	C3H	---	5 mg. in sesame oil, weekly	S.C.	1[6]	---	---
Schönberg and Ghonaim, 1946	26 fowls	2 Egyptain races	F	0.6750 g. (total dose) 63 days	P.O.	0	All alive at 65 days	65 days
305.--TYRAMINE 								
Paunz, 1954	1 dog	---	F	5% soln. 2-5 cc. daily	S.C.	0	---	1 year
Hainlein, 1956	Cats	---	---	---	---	0	---	Up to 6 mos.
Enger and Lampas, 1960	6 dogs	---	---	15-1000 mg. daily plus 200-3500 mg. in aq. soln. several times daily	S.C.	0	---	6 mos. to 2-1/2 years
305.--XYLENE								
Kennaway, 1926a	Several hundred mice	---	---	---	Skin painting	0	---	9 mos.
Kennaway, 1926c	Mice	---	---	---	Skin painting	0	---	---
Berenblum, 1941a	60 mice	Inbred albino	---	Weekly applications	Skin	1 pap.[7]	---	25 weeks

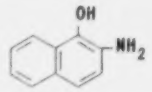
1. Of the testis
2. Foster nursed by CBA mice
3. Foster nursed by Strong A mice
4. Foster nursed by R III mice
5. Foster nursed by CBA and R III mice
6. Lymphoid
7. Regressed and finally disappeared

386.--ACETYL-β-NAPHTHYLAMINE



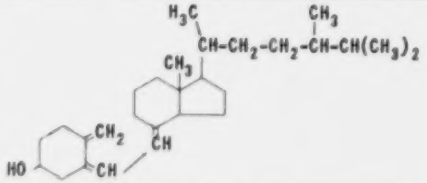
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Cook et al., 1940a	Mice	---	---	---	P.O.	0[1]	---	---

387.--2-AMINO-1-NAPHTHOL[2]



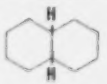
Hueper, 1938	25 mice	Stock white	---	Concentrated soln. in olive oil, 0.1 cc. twice weekly	I.P.	8[3]	---	Ca. 6 mos.
	25 mice	Stock white	---	Concentrated soln. in rabbit serum, 0.1 cc. twice weekly	I.P.	--do--	---	--do--

388.--CALCIFEROL (Vitamin D_2)



Barry et al., 1935	50 mice	Stock	---	0.35 in benzene, twice weekly	Skin painting	0	29 alive at 6 mos. 11 alive at 1 year	518 days
	20 mice	Stock	F	--do--	--do--	0	15 alive at 6 mos. 11 alive at 1 year	583 days
Hachmann et al., 1937	20 mice	--do--	F	--do--	--do--	0	11 alive after 1 year	703 days
Franciosi, 1942	15 mice	---	---	---	Skin	0[4]	---	6-11 mos.
	6 pigeons	---	---	---	--do--	0	---	2-1/2 mos.
	15 mice	---	---	---	S.C.	0[5]	---	11 mos.
	10 rats	---	---	---	--do--	0	---	26 mos.
McChesney, 1944	54 rats	Albino	---	2-3 mg. per kg. body wt. per day in corn oil	P.O.[6]	0	---	Over 43 days

389.--DECAHYDRONAPHTHALENE[7]

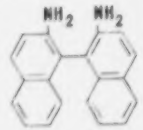


Kennaway, 1950	10 mice	---	---	---	Skin	0[8]	---	---

1. No liver lesions in 6 livers examined
2. Impure
3. 5 retothelial sarcomas, 2 pulmonary adenomas, 1 sebaceous gland adenoma, 1 myeloid leukemia, 1 splenic hemangioma
4. 3 neoplasms
5. Ehrlich type mammary adenocarcinoma
6. By stomach tube
7. Commercial grade (decalin)
8. 1 subcutaneous melanoma

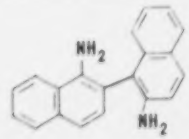
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

390.--2,2'-DIAMINO-1,1'-DINAPHTHYL



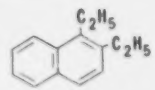
Cook, 1940	Mice	---	---	---	Skin, S.C. & P.O.	Tumors[1]	---	---

391.--1,2'-DIAMINO-1',2-DINAPHTHYL



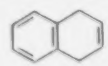
Badger et al., 1942	20 mice	Stock	---	0.6% in benzene twice weekly	Skin	0[2]	12 alive at 1 year, 18 alive at 6 mos.	587 days
	10 mice	--do--	---	5 mg. in glycerol, repeated inj.	S.C.	0	6 alive at 6 mos., 4 alive at 1 year	445 days
	15 mice	--do--	---	In food	P.O.	0[3]	7 alive at 6 mos., 5 alive at 1 year	565 days

392.--1,2-DIETHYLNAPHTHALENE



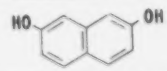
Berenblum, unpub. results[4]	10 mice	Stock	M	2% in benzene appl. twice weekly	Skin	0	All lived	54 weeks
	--do--	--do--	M	10% (20 mg.) in arachis oil, 0.2 ml	S.C.	0	---	54 weeks

393.--DIHYDRONAPHTHALENE



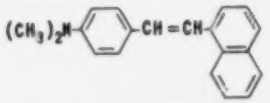
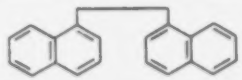
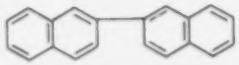
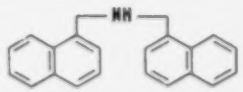
Kennaway, 1930	10 mice	---	---	---	Skin	0	---	---

394.--2,7-DIHYDROXYNAPHTHALENE

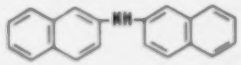
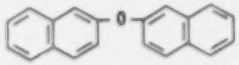
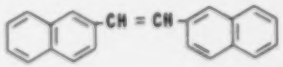
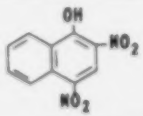
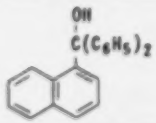
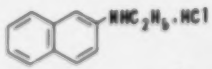


Jones, 1943	10 mice	A	M	2 mg. or less weekly	S.C.	0	---	Several mos.
	10 mice	C3H	M	--do--	--do--	0	---	--do--
	10 mice	A	M, castr	--do--	--do--	0	---	--do--
	10 mice	C3H	--do--	--do--	--do--	0	---	--do--
	47 mice	C3H	F	2 mg. or less weekly or 3 times weekly	--do--	0	---	2-1/2 to 10-1/2 mos.

1. Liver cell tumors but mostly of a cholangiomatous type
2. 1 stomach papilloma and 1 possible tumor at pylorus
3. 1 doubtful hepatoma
4. Synthesized by Wolf, G. and Robinson, R.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
395.--1-(4'-DIMETHYLAMINOPHENYL)-2-(1'-NAPHTHYL)-ETHYLENE 								
Haddow et al., 1948	24 rats	Albino	M & F	6 x 5 mg. soln. arachis oil, 2 to 3 week intervals	S.C.	10 sarc.[1]	---	Ca. 406 days
	24 mice	Stock	M & F	8 x 1.0 mg. soln. arachis oil, 2-3 week intervals	S.C.	Tumors[2]	6 alive at 18 mos.	Ca. 18 mos.
398.--α,α--DINAPHTHYL 								
Kennaway, 1930	Mice	---	---	In benzene	Skin painting	0	---	---
Kennaway and Hieger, 1930	--do--	---	---	--do--	--do--	0	---	---
399.--β,β--DINAPHTHYL 								
Kennaway, 1930	Mice	---	---	In benzene	Skin painting	0	---	---
Kennaway and Hieger, 1930	--do--	---	---	--do--	--do--	0	---	---
400.--α,α--DINAPHTHYLAMINE 								
Boyland and Brues, 1937	30 mice	Stock and Simpson albino	---	0.3% in benzene twice weekly	Skin painting	0[3]	---	Over 1 year

1. Also 1 hypernephroma, 1 mammary ademona
2. Latent period 215 days
3. Liver changes noted

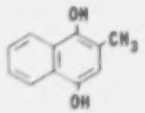
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
401.--β,β--DINAPHTHYLAMINE 								
Boyland and Brues, 1937	30 mice	Stock and Simpson, albino	---	0.3% in benzene twice weekly	Skin painting	0[1]	---	Over 1 year
402.--β--DINAPHTHYL ETHER 								
Kennaway, 1930	Mice	---	---	In benzene	Skin painting	0	---	---
403.--DI-2-NAPHTHYLETHYLENE 								
Badger et al., 1942	10 mice 11 mice	C3H --do--	--- ---	0.3% in benzene 2 times weekly In food	Skin painting P.O.	0 0	5 alive at 6 mos. 9 alive at 6 mos.	294 days 322 days
404.--2,4--DINITRO-1-NAPHTHOL 								
Kinosita, 1940b	Rats	---	---	5 mg. per kg. body wt. in food	P.O.	0	---	Long period
405.--DIPHENYL-α-NAPHTHYLCARBINOL 								
Noble, 1939b	6 rats	Wistar	M & F	100 mg. crystals	S.C.	0	---	4 weeks
406.--ETHYL-β-NAPHTHYLAMINE HYDROCHLORIDE 								
Schär, 1930a	2 rabbits	---	---	Vapors	Inhalation	0	---	24 mos.
Schär, 1950a	4 rabbits	---	---	--do--[2]	--do--	0	---	At least 6 mos.

1. Liver changes noted

2. 100 mg. breathed daily by all 4 animals

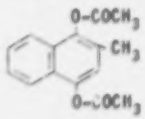
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
407.--1-ISOPROPENYLNAPHTHALENE, DIMER $C_{26}H_{24}$								
Cook, 1953b	10 mice	Stock	---	0.1% in benzene twice weekly	Skin	0	1 alive at 6 mos., 1 at 1 year	415 days
	10 mice	--do--	---	--do--	--do--	0	10 alive at 6 mos., 10 alive at 296 days	296 days

408.--2-METHYL-1,4-NAPHTHOHYDROQUINONE



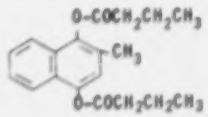
Shimkin, 1941b	20 mice	Swiss or C3H	---	0.5 or 1.0 mg. in sesame oil every 5 days 5 or 6 doses	S.C.	0	---	60 days
Ansbacher et al., 1942	2 cats	---	---	5 and 10 mg. per kg. body wt. daily	S.C.	0	---	59 days

409.--2-METHYL-1,4-NAPHTHOHYDROQUINONE DIACETATE



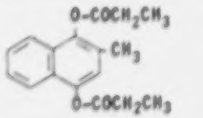
Ansbacher et al., 1942	Rabbits	---	---	4 mg. per kg. body wt. daily	P.O.	0	---	56 days

410.--2-METHYL-1,4-NAPHTHOHYDROQUINONE DI-n-BUTYRATE

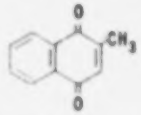
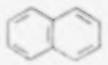
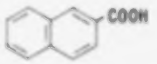
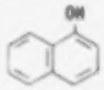


Ansbacher et al., 1942	2 cats	---	---	20 and 40 mg. per kg. body wt. daily	S.C.	0	---	125 days

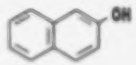
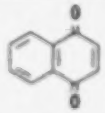
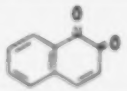
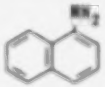
411.--2-METHYL-1,4-NAPHTHOHYDROQUINONE DIPROPIONATE



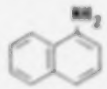
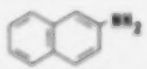
Ansbacher et al., 1942	Rabbits	---	---	4 mg. per kg. body wt. daily	P.O.	0	---	56 days
	2 cats	---	---	2 mg. per kg. daily	--do--	0	---	42 days
	1 dog	---	---	40 mg. per kg. daily	--do--	0	---	52 days
	--do--	---	---	2 mg. per kg. daily	--do--	0	---	118 days
	2 monkeys	---	---	2 mg. per kg. daily	--do--	0	---	57 days
	1 cat	---	---	20 mg. per kg. daily	S.C.	0	---	42 days

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
412.--2-METHYL-1,4-NAPHTHOQUINONE 								
Molitor and Robinson, 1940	Rats	---	---	0.25-0.5 g. per kg. body wt. suspended in 10% aq. gum acacia soln. daily	P.O.[1]	0	---	30 days
Snimkin, 1941b	34 mice	Swiss or C3H	---	10.5 or 1.0 mg.% in sesame oil every other day or 3 times weekly, 8-18 times	S.C.	0	---	60 days
Ansbacher et al., 1942	Rabbits	---	---	4 mg. per kg. body wt. daily	P.O.	0	---	36 days
	2 cats	---	---	2 mg. per kg. daily	--do--	0	---	74 days
	2 dogs	---	---	--do--	--do--	0	---	79 days
	1 dog	---	---	0.50 mg. per kg. daily	--do--	0	---	36 days
	2 monkeys	---	---	0.5 and 1 mg. per kg. daily	P.O.	0	---	50 and 57 days
	2 cats	---	---	5 mg. per kg. daily	S.C.	0	---	39 days
	1 dog	---	---	20 mg. per kg. daily	S.C.	0	---	36 days
	--do--	---	---	12 mg. per kg. in 5 inj.	I.V.	0	---	49 days
413.--NAPHTHALENE 								
Bloch, 1922	Mice	---	---	---	Skin painting	0	---	---
Kennaway, 1930	--do--	---	---	In benzene	--do--	0	---	---
Kennaway and Hieger, 1930	--do--	---	---	---	--do--	0	---	---
414.--β-NAPHTHOIC ACID 								
Kennaway, 1930	Mice	---	---	In benzene	Skin painting	0	---	---
415.--α-NAPHTHOL 								
Shear and Stewart, 1941	11 mice	A	M	5% in lard, 0.25 cc., repeated inj.	S.C.	0	---	21 mos.
	10 mice	Stock	F	--do--	S.C.	0	---	21 mos.
	10 mice	A	---	--do--	S.C.	0	---	21 mos.

1. By stomach tube

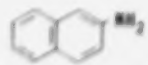
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
416.--β-NAPHTHOL 								
Shear and Stewart, 1941	10 mice 10 mice 10 mice	Stock D A	F M ---	0.2% in lard. 0.25 cc., repeated inj. ---do--- ---do---	S.C. S.C. S.C.	1 sarc.[1] ---do--- ---do---	--- --- ---	21 mos. ---do--- ---do---
417.--α-NAPHTHOQUINONE 								
Tanizawa, 1940b	Mice	---	---	0.25% in benzene every 1 or 2 days	Skin	1 epi.[2] 6 pap.	37 alive at 200 days	Over 200 days
	Mice	---	---	0.1% in benzene every 1 or 2 days	---do---	3 epi.[3] 5 pap.	39 alive at 200 days	Over 200 days
Tanizawa, 1940c	Mice	Stock	---	0.1% or 0.25% in benzene every 1 or 2 days	Skin	3 epi. 11 pap.[4]	77 alive at 200 days	At least 557 days
418.--β-NAPHTHOQUINONE 								
Tanizawa, 1940b	Mice	Stock	---	0.1 or 0.25% in benzene every 1 or 2 days	Skin painting	0	25 alive at 200 days	Over 200 days
Tanizawa, 1940c	Mice	---	---	0.1% in benzene every 1 or 2 days	Skin	0	25 alive at 200 days	---do---
419.--NAPHTHOYLBENZOIC ACID[5]								
Kennaway, 1930	Mice	---	---	In benzene	Skin painting	0	---	---
420.--α-NAPHTHYLAMINE 								
Stoeber, 1909	Rabbit	---	---	Soln. in olive oil	S.C., ear	0[6]	---	---

1. In albino female
2. No lung cancers. 1 papilloma and 2 lung cancers out of 46 controls with benzene alone.
3. 3 lung cancers
4. 3 papillomas before 200 days; also 2 lung cancers
5. Isomer not stated
6. Strong atypical proliferation

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
620.--α-NAPHTHYLAMINE (Continued) 								
Rutschinski, 1910b	5 rabbits	---	---	Soln. in water, 2 inj.	S.C., ear	0[1]	---	21 to 25 days
	5 rabbits	---	---	Soln. in olive oil inj.	--do--	--do--	---	25 days
Bentzin, 1911	Rabbits	---	---	In olive oil or rabbit fat.	I.V., ear	0	---	At least 8 weeks
Jaffé, 1920	5 mice	---	---	Vapors	Inhalation	0[2]	Majority alive at 6 mos.	Over 1 year
	3 rats	---	---	--do--	--do--	--do--	--do--	--do--
	3 rabbits	---	---	--do--	--do--	--do--	--do--	--do--
Berenblum and Boneer, 1937	18 rabbits	---	---	1% suspension[3] in water, 15 cc. of 5% inj.	I.P.	0	8 alive at 6 mos.	Over 1 year
Schär, 1950a	2 rabbits	---	---	Vapors	Inhalation	0	---	24 mos.
Schär, 1950b	4 rabbits	---	---	--do--[4]	--do--	0[5]	---	20 mos.
Maruya, 1937	Rats	---	---	In food	P.O.	0[6]	---	---
Maruya, 1938	10 rats	White	M & F	0.06% in food	P.O.	1[7]	---	288 days
Shear and Stewart, 1941	10 mice	Stock	M	1% in lard, 0.25 cc. repeated inj.	S.C.	0	---	15 mos.
	12 mice	---	M	--do--	S.C.	0	---	--do--
Yoshida et al., 1941a	Rats	White	---	Crystals in collodion	Bladder	Pap.	---	125 days
Rhoads, 1946[8]	Animals[9]	---	---	---	P.O.	0	---	---
621.--β-NAPHTHYLAMINE 								
Hesthausen, 1916	Rabbits	---	---	20% salve or 10% in collodion every day or third day	Skin painting	0	---	1 mo.
Schär, 1950a	2 rabbits	---	---	Vapors	Inhalation	0	---	24 mos.
Schär, 1950b	4 rabbits	---	---	--do--[4]	--do--[4]	1[10]	---	2 years
Perimann and Staehler, 1953	35 rabbits	---	---	1 mg. daily	S.C.	6[11]	S.C.	---

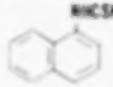
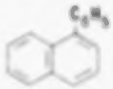
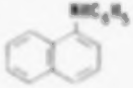
1. In 4 cases epithelial proliferation
2. Changes in organs noted
3. Compound purified
4. 100 mg. breathed daily by all 4 animals
5. 1 benign bladder polyp.
6. Proliferation of the epithelial cells of the renal pyramid
7. Kidney papillomas
8. Private communication to Dr. Paul A. Neal
9. Not specified; probably rats, and/or dogs
10. Carcinoma of the bladder
11. Of the bladder

921.--β-NAPHTHYLAMINE (Continued)

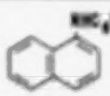
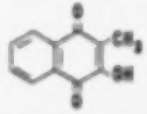
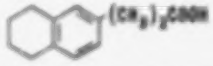
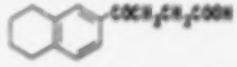


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Perlmann and Staehler, 1932	51 rabbits	---	---	1 mg. in alcohol daily	S.C.	6[1]	---	---
	9 rabbits	---	---	0.5 mg. in alcohol plus 0.5 mg. of aniline daily	S.C.	0	---	---
Perlmann and Staehler, 1932a	51 rabbits	---	M & F	1% in alcohol, 0.1 cc. daily	S.C.	6[2]	17 died in 6 mos.	14 mos.
Nicole, 1935	15 rabbits	---	---	Vapors[3]	Inhalation	2[4]	---	Over 3 mos.
Herenblum and Bonser, 1937	16 rabbits	---	---	1% suspension[5] in water, 15 cc. avg. of 62 inj.	I.P.	0	12 alive at 6 mos.	4 years, 1 mo.
	29 rats	---	---	In food[6]	P.O.	0	---	1 mo.
Maruya, 1937	Rats	---	---	---	P.O.	0	---	---
Hueper and Wolfe, 1937	16 dogs	---	F	12 to 15 mg.[7] daily for 1 year then 10 animals received in addition 150 to 450 mg. daily	P.O. & S.C.	4[8]	---	At least 1 year
Hueper et al., 1938a	4 rabbits	---	---	Saturated soln. in rabbit serum twice weekly	---	0	---	5 mos.
	4 rabbits	---	---	Saturated soln. in whole rabbit blood	I.V.	0	---	---
Hueper et al., 1938b	16 dogs	Stock	F	Aqueous soln. of hydrochloride daily, followed by oral administration of free base	S.C., P.O.	11[9]	---	At least 26 mos.
Maruya, 1938	9 rats	White	M & F	0.06% in food	P.O.	0	---	298 days
Satani et al., 1941	36 rabbits	---	---	In olive oil or alcohol	S.C.	18 pap.[10]	---	---
	65 guinea pigs	---	---	--do--	--do--	13 pap.[10]	---	---
	Rats	White	---	--do--	--do--	---	---	---
	6 rabbits	---	---	--do--	Bladder	5 pap.[10]	---	---
	Rats	White	---	In ether	Skin painting	---	---	---
	18 rabbits	---	---	In olive oil or alcohol	Bladder & S.C.	15 pap.[10]	---	---
Yoshida et al., 1941a	Rats	White	---	Crystals in collodion	Bladder	Pap.	---	125 days
Bonser, 1943	4 dogs	---	M & F	100-700 mg. in food daily[5]	P.O.	Tumors[11]	3 alive at 3.7 years	1-5 years
Rhoads, 1946[12]	Dogs	---	---	---	P.O.	Tumors[13]	---	---
	125 rats	---	---	---	P.O.	2 tumors[14]	---	At least 704 days

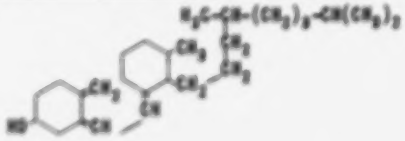
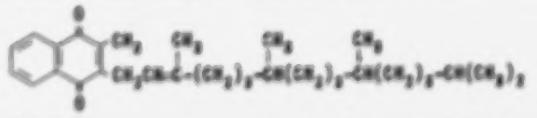
1. Fibroepithelial papillomas of the bladder
2. Of the bladder
3. With concurrent subcutaneous injection of embryonic pulp
4. Of lung, very much like cancer
5. Compound purified
6. Along with aniline and benzene
7. Commercial product, 98% pure; contains almost 1% of dinaphthylamine
8. Multiple papillomas of the bladder, some benign, others malignant; also liver cirrhosis. All in oral group
9. Papillomas and carcinomas of bladder, believed to be due to compound fed not injected
10. Of the bladder
11. Papillomas and carcinomas of the bladder in 3 animals, dying after 3.7 years
12. A private communication to Dr. Paul A. Neal
13. 100% incidence of bladder cancer
14. Bladder papilloma and cancer, one at about 500 days, and one at 704 days

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
422.--β-NAPHTHYLAMINE HYDROCHLORIDE								
Hueper, 1942a	14 dogs	Strain	F	Up to 15 mg. daily, then after 1 year 100 to 440 mg.	S.C., P.O.	14[1]	2 alive neg. at 2 years	2 years
Hueper, 1942b	10 rabbits	----	----	In aqueous soln. daily	I.V.	4	----	9 mos.
	10 rabbits	----	----	---do---	I.P.	0	----	---do---
	Rats	----	----	10 mg. daily	P.O.	6	----	2 mos.
	Dogs	----	----	12 to 15 mg. daily	P.O.	0	----	10 mos.
423.--α-NAPHTHYL THIOUREA 								
McClosky et al., 1941	1 dog	----	----	40 mg. per kg. body wt.	P.O.	0	----	42 days
	Rabbits	----	----	200 mg. per kg. body wt., 5-1/2-6-1/2 times	P.O.	0	----	----
	Cats	----	----	10-60 mg. per kg. body wt., repeatedly	P.O.	0	----	Not over 56 days
Dieke and Richter, 1946	524 rats	Wild brown Norway	M & F	1.4-46 mg./kg.	I.P.	1	----	At least 1-1/2 years
Dieke, 1947	5 rats	Black Norway	M & F	Avg. 74 mg./kg. in food	P.O.[2]	1[3]	All dead after 115 days	At least 282 days
Fitzhugh and Nelson, 1947	225 rats	Weanlings	M	0.025% in food*	P.O.	0	----	Ca. 2 years
424.--α-PHENYL NAPHTHALENE 								
Kennaway, 1930	Mice	----	----	In benzene	Skin	0	----	----
Kennaway and Hieger, 1930	---do---	----	----	----	---do---	0	----	----
425.--PHENYL-α-NAPHTHYLAMINE 								
Schär, 1952a	2 rabbits	----	----	Vapors	Inhalation	0	----	24 mos.
Schär, 1952a	4 rabbits	----	----	---do---[4]	---do---	0	----	At least 4 mos.

1. Benign papillomas of the bladder; carcinomas 2 in the first year
2. By stomach tube
3. Effect on growth of hair
4. Toxicity experiment
5. 100 mg. breathed daily by all 4 animals

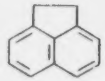
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
425.--PHENYL-α-NAPHTHYLAMINE (Continued) 								
Shear and Stewart, 1961	10 mice 6 mice 5 mice	A Stock ---	♂ ♂ ♀	5%[1] in lard, 0.5 cc. repeated inj. Ca. 5 mg. crystals[1]; repeated inj. --do--	S.C. --do-- --do--	0 0 0	--- --- ---	24 mos. --do-- --do--
426.--PHENYL-β-NAPHTHYLAMINE								
Shear and Stewart, 1961	10 mice 6 mice 4 mice	Stock Stock W	--- --- ♂	5%[1] in lard, 0.25 cc. repeated inj. Ca. 5 mg. crystals[1] repeated inj. --do--	S.C. S.C. S.C.	0 0 0	--- --- ---	22 mos. --do-- --do--
427.--PHTHIOCOL 								
Mettler and Robinson, M.J., 1960	Rats	---	---	0.1 and 0.35 g./kg. body wt. susp. in 10% aq. gum acacia soln. daily	P.O.[2]	0	---	30 days
428.--TETRAHYDRONAPHTHALENE								
Kennaway, 1930	30 mice 100 mice	---	---	Commercial grade Purified grade	Soln --do--	1 epi. 0	--- ---	132 days ---
Kennaway and Hieger, 1930	30 mice 100 mice	---	---	Commercial grade Purified grade	--do-- --do--	1 epi. 0	--- ---	---
429.--γ-(2-TETRALYL)-BUTRIC ACID 								
Kennaway, 1930	Mice	---	---	In benzene	Soln	0	---	---
430.--β-(2-TETROYL)-PROPIONIC ACID 								
Kennaway, 1930	Mice	---	---	In benzene	Soln	0	---	---

1. Technical grade of substance used
2. By stomach tube

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
431.--VITAMIN D_3 								
McCheeney, 1964	45 rats	Albino	---	1.5-2.25 mg. per kg. body wt. per day in corn oil	P.O.[1]	0	---	Over 59 days
432.--VITAMIN E_1 (Synthetic) 								
Mellitor and Robinson, 1960	Rats	---	---	0.39 and 2.0 g./kg. body wt. susp. in 10% aq. gum acacia soln. daily	P.O.	0	---	30 days

1. By stomach tube

433.--ACENAPHTHENE

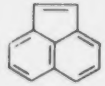


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Bloch, 1922	Mice	---	---	---	Skin	0	---	---
Kennaway, 1924a	100 mice	---	---	1% in "90% benzol"	Skin	0[1]	---	9 mos.
Kennaway, 1924b	--do--	---	---	--do--	--do--	0	---	--do--
Kennaway, 1924c	Mice	---	---	--do--	--do--	0	---	---
Kennaway and Hieger, 1930	--do--	---	---	---	--do--	0	---	---

434.--ACENAPHTHENE CHOLEIC ACID[2]

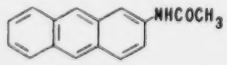
Shear, 1941**	14 mice	A	M	10 mg. crystals, repeated inj.	S.C.	0	---	19 mos.
Shear and Leiter, 1941a	14 mice	A	M	60 mg. crystals (total dose) in 7 inj.	--do--	0	10 alive at 15 mos.	--do--

435.--ACENAPHTHYLENE



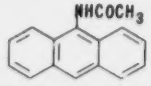
Cook, 1932b	20 mice	Stock	---	0.25% in benzene	Skin	0	13 alive at 6 mos. 7 alive at 1 year	522 days

436.--2-ACETYLAMINOANTHRACENE



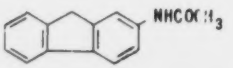
Green, H.N., 1943	Rats	---	---	In food	P.O.	0[3]	---	Several mos.
Bielschowsky, 1946	5 rats	Albino	---	2 mg.-3 mg. 1-2 weeks, daily	P.O.	0	---	6 weeks

437.--9-ACETYLAMINOANTHRACENE

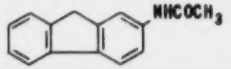


Bielschowsky, 1946	5 rats	Piebald	M	6 mg. daily in food	P.O.	0	All alive at 1 year	At least 36 weeks

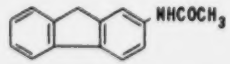
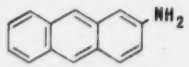
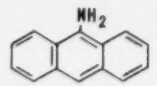
1. Distinctly toxic
2. Acenaphthene to desoxycholic acid in the molecular ratio of 1:2
3. Changes in liver

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
439.--2-ACETYLAMINOFLUORENE 								
Wilson, R.H. et al., 1941	5 rats	---	M	50 mg. in propylene-glycol (per kg. body wt.)	S.C.	0	---	3 mos.
	--do--	---	F	1 g. per kg. body wt.	P.O.[1]	0	1 died in 8 mos.	14 mos.
	--do--	---	M	0.5 mg. crystals	S.C.	0	---	--do--
	7 mice	C57	M & F	2.5 mg. in sesame oil, two inj.	--do--	0	6 killed at 10 mos.	--do-
	Rats	Albino	F	0.25 to 1.0% in food	P.O.	0	Toxic	22-93 days
	5 rats	--do--	M	0.125% in food	--do--	0	All died in 100 d.	100 days
	5 rats	--do--	F	0.125% in food for 95 days	--do--	4[2]	---	381 days
	20 rats	--do--	F	0.125% in food	--do--	9[3]	8 died neg. early	273 days
	5 rats	--do--	F	--do--	P.O.	0	All died in 100 days	100 days
	--do--	--do--	M	0.0625% in food	--do--	1[4]	3 died in 100 days	213 days
	--do--	--do--	F	0.031% in food	--do--	5[5]	---	280 days
Bielschowsky, 1943	Rats	White	---	4 mg. per day	P.O.	Tumors[6]	---	20-30 weeks
Green, H.N., 1943	26 rats	---	M & F	In food	P.O.	Ca.23[7]	---	Several mos.
	Rats	---	---	---	Skin painting or S.C.	0	---	---
Armstrong and Bonser, 1944	17 mice	CBA	M & F	0.2 cc. of 1.5% suspension in olive oil 3 times weekly	P.O.[1]	Tumors[8]	---	At least 65 weeks
Bielschowsky, 1944a	104 rats	Wistar	M & F	4-6 mg. per day in food	P.O.	93[9]	---	At least 42 weeks
Bielschowsky, 1944b	10 rats	---	M & F	4 mg. per day in food for 30 weeks[10]	P.O.	10[11]	---	286 days

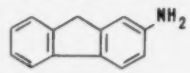
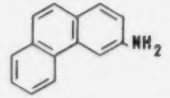
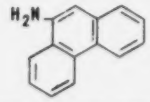
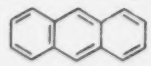
1. Stomach tube.
2. First in 136 days. 1 subcutaneous sarcoma, 1 breast(?) carcinoma, 1 bladder carcinoma and 1 subcutaneous carcinoma.
3. 7 bladder carcinomas, 1 kidney pelvic carcinoma, 3 subcutaneous carcinomas, 1 ureter carcinoma, 1 colon carcinoma, 1 with metastases.
4. Carcinoma of the bladder, liver and pancreas (213 days) with metastases.
5. At different sites.
6. Female rats; majority of these tumors were adenocarcinomas of the breast which became evident at average of 250 days.
7. Liver tumors, breast adenocarcinomas, 1 sarcoma of the uterus; metastases to liver, breast and lungs.
8. 5 bladder tumors 3 benign, 2 malignant; also neoplastia of the liver and uterus. Hyperplasia of mammary tissue and degenerative changes in testes.
9. Malignant carcinoma of the liver, mammary gland, acoustic duct, intestine, uterus and skin, also leukemia. Unequal distribution of tumors between the sexes.
10. Along with 5 or 6 mg.; per day of allyl-thiourea to produce goitre.
11. 9 adenomas of thyroid, 5 malignant hepatomas, 6 tumors of acoustic duct; one beginning carcinoma of kidney; 2 adenocarcinomas of breast; one lung adenoma.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
439.--2-ACETYLAMINOFLUORENE (Continued) 								
Bielschowsky, and Green, 1945	5 fowls	RIR.	M	3-30 mg. in food daily for 45 weeks	P.O.	1[1]	2 alive at 80 weeks	At least 87 weeks
Vazquez Lopez, 1945	12 rats	---	---	0.5 gm./kg. of food	P.O.	4[2]	7 alive at 24 weeks	24 weeks
Cantarow et al., 1946	21 rats	Sherman	M & F	0.03% in diet[3]	P.O.	6[4]	---	At least 316 days
Heiman and Meisel, 1946	59 rats	Wistar	M & F	10-20 mgm. 1-3 days in peanut oil	S.C., pharynx	Tumors[2]	---	At least 227 days
Wilson and DeEds, 1946	Rats	---	---	0.008%-0.016 in food	P.O.	---	---	---
	5 rats	---	---	0.004% in food	P.O.	Tumors[5]	---	---
	--do--	---	---	0.001% in food	P.O.	0	---	---
	Rats	---	---	0.031%-0.125%	P.O.	0	---	54 days
	--do--	---	---	--do--	--do--	Tumors[5]	---	75 days
	--do--	---	---	--do--	--do--	--do--	---	50 days
	--do--	---	---	--do--	--do--	Tumors[6]	---	25 days
Armstrong and Bonser, 1947	25 mice	CBA	M & F	6 mgm. per week in arachis oil	P.O.[7]	Tumors[2]	18 alive at 20 weeks	At least 77 weeks
	28 mice	IF	-do-	--do--	--do--	--do--	20 alive at 20 weeks	--do--
	24 mice	RIII	-do-	--do--	--do--	--do--	21 alive at 20 weeks	--do--
	45 mice	White label	-do-	--do--	--do--	--do--	24 alive at 20 weeks	--do--
	36 mice	Strong A	-do-	--do--	--do--	--do--	25 alive at 20 weeks	--do--
Bielschowsky, 1947	55 rats	Wistar	M & F	4 mg. daily for 25 weeks in food[8]	P.O.	--do--	---	At least 265 days
	55 rats	--do--	-do-	--do--	P.O.	--do--	---	At least 274 days
	55 rats	--do--	-do-	--do--	--do--	--do--	---	At least 279 days
Dunning et al., 1947	10 rats	Marshall	F	Average of 3.4 mg. per day for 1 year	P.O.	2[9]	---	At least 512 days
	--do--	August	F	Average of 3.6 mg. per day for 1 year	P.O.	3[10]	---	At least 384 days
	--do--	Fischer	F	Average of 3.2 mg. per day for 1 year	P.O.	3[11]	---	At least 400 days
	--do--	AXC	F	Average of 3.5 mg. per day for 1 year	P.O.	2[12]	---	At least 700 days

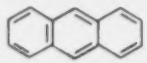
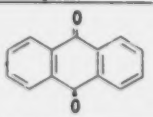
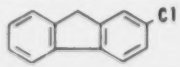
1. Anaplastic carcinoma in the kidney.
2. Different kinds in different sites.
3. Different groups had 03% chemical plus thiouracil, estradiol and testosterone.
4. Hepatomas.
5. Microscopic, and microscopic lesions.
6. Minimal lesions but still carcinogenic.
7. Stomach tube.
8. Different diets.
9. Liver; also 6 benign.
10. Liver; also 5 benign, 1 mammary; metastases to pancreas.
11. Liver; also 7 benign, 2 mammary; also lung metastases from mammary gland tumor.
12. 5 benign; 1 bladder, 1 mammary.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
439.--2-ACETYLAMINOFLUORENE (Continued) 								
Dunning et al., 1947 (cont'd.)	10 rats	Copenhagen	F	Average of 3.0 mg. per day for 1 year	P.O.	4[1]	---	At least 700 days
Foulds, 1947	22 mice	R III	M & F	0.03% for 5 weeks, 0.05% for 20 weeks	P.O.	Tumors[2]	---	84 weeks
Harding, H.E., 1947	7 cats	---	---	5 mgm. in food, daily (later increased to 20 mgm.)	P.O.	Tumors[3]	7 alive at Ca. 3 mos.	Ca. 167 weeks
Hoch-Ligeti, 1947a	Rats	Piebald & albino	---	0.07% in food	P.O.	Tumors[4]	---	---
Hoch-Ligeti, 1947b	20 rats	Albino	M & F	0.07% in food	P.O.	15[5]	---	Ca. 500 days
Morris et al., 1947	Rats	---	---	0.05% in food (daily ingestion 4.0-4.7 mgm.)	P.O.	Tumors[6]	---	160 days
	Rats	---	---	2% acetone soln. thrice weekly (0.5 mgm. first 6 mos. 1.00 mgm. thereafter)	Skin, scapular region	--do--	---	--do--
Wilson et al., 1947	Rats	---	M	0.016, 0.008, and 0.001% diets	P.O.	Tumors[7]	---	Ca. 741 days
	Rats	---	F	0.004% in diet	P.O.	---	---	--do--
	Mice	C57, C3H Bagg albino	---	0.031-0.5% in diet	P.O.	Tumors[8]	---	Avg. time 349 days
440.--2-AMINOANTHRACENE 								
Shear, 1938	Mice	Pure strain	---	---	---	Tumors[9]	---	---
Bielschowsky, 1946	10 rats	Wistar	M	2-5 drops in acetone 3 times weekly	Skin	Tumors[10]	---	At least 39 weeks
	9 rats	Piebald	M	2-5 drops in acetone 3 times weekly	Skin	Tumors[11]	---	--do--
	20 mice	Albino	M & F	0.25 cc. of Sat. soln. in lard 7-10 injection	S.C.	6 Tumors[12]	---	20 mos.
	5 rats	Albino	---	6 mg. daily for 5 days in feed	P.O.	0	All dead at 2 days	5 days
441.--9-AMINOANTHRACENE 								
Bielschowsky, 1946	5 rats	Albino	M	---	Skin	0	---	At least 54 weeks
	5 mice	--do--	-do-	---	--do--	0	---	--do--

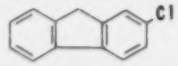
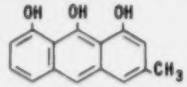
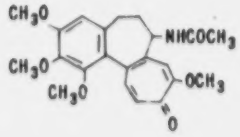
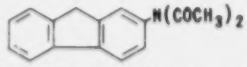
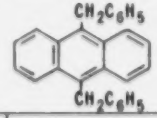
1. Liver; 2 benign; 2 bladder; lung metastases of malignant hepatomas.
2. 17 mammary, 12 bladder, 2 hepatomas.
3. First in the lungs, liver later; cholangiomas and hepatomas. No metastases.
4. Solid multifocal hepatomas in liver, tumors with metastases to the regional lymph glands and in the lungs.
5. Between 183-461 days.
6. Specifications not given.
7. In the 0.016 and 0.008% concentrations.
8. Appeared later than in rats. 1 carcinoma of bladder, some liver adenomas.
9. Liver-cell.
10. Spindle-cell tumor, papilloma, basal-cell carcinoma.
11. Papilloma, squamous carcinomas, basal-cell carcinomas, spindle-cell tumors.
12. Multiple hepatomas in 6 mice.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
442.--2-AMINOFLUORENE 								
Green, 1943	Rats	---	---	---	Skin or pellets, S.C.	0	---	---
Bielschowsky, 1944a	5 Rats	Wistar	M & F	4% in acetone thrice weekly for 210 days	Skin	Tumors[1]	4 alive at 280 days	At least 280 days
Wilson and DeEds, 1946	Rats Mice	--- ---	--- ---	In food --do--	P.O. --do--	Tumors --do--	--- ---	--- ---
Morris et al., 1947	Rats --do--	--- ---	--- ---	0.05% in food (4.0-4.7 mgm. daily ingestion) 2% acetone soln. thrice weekly[3]	P.O. Skin	Tumors[2] --do--	--- ---	160 days --do--
443.--3-AMINOPHENANTHRENE 								
Joseph, 1939	100 mice 20 mice	--- ---	--- ---	2% in benzene, twice weekly, 5 mos. 0.02 gm. in paraffin	Skin S.C.	0 0	--- ---	7 mos. --do--
444.--9-AMINOPHENANTHRENE 								
Shear, 1941**	20 mice	A	M	2.5 mg. in lard, repeated injections	S.C.	0	---	16 mos.
445.--ANTHRACENE 								
Bloch, 1922	Mice	---	---	---	Skin	0	---	---
Kennaway, 1924a	100 mice	---	---	In olive oil	Skin	0	---	9 mos.
Kennaway, 1924b	100 mice	---	---	In olive oil	Skin	0	---	9 mos.
Kennaway, 1924c	Mice	---	---	---	Skin	0	---	---
Maisin et al., 1927	Mice	---	---	---	Skin	0	---	2 years
Kennaway and Hieger, 1930	Mice	---	---	---	Skin	0	---	---
Barry et al., 1935	50 mice	Stock	---	0.3% in benzene twice weekly[4]	Skin	0	34 alive at 6 mos. 16 alive at 1 year	615 days

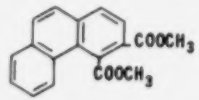
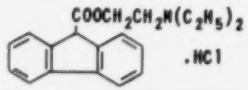
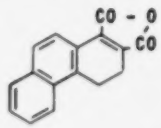
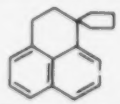
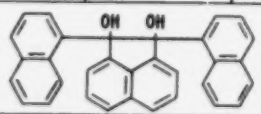
1. 5 advanced liver tumors; 1 carcinoma of the acoustic ducts, at least 1 malignant.
2. Types and location not given.
3. 0.5 mg. first 6 mos., 1.00 mg. thereafter.
4. Synthetic compound used.

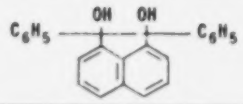
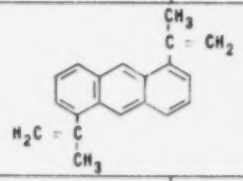
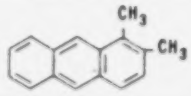
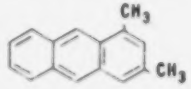
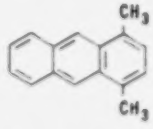
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
445.--ANTHRACENE (Continued) 								
Boyland and Burrows, 1935	10 rats	---	---	0.05% aqueous colloidal soln. with lecithin, 2 cc. weekly	S.C.	0	2 alive at 18 mos.	103 weeks
Bachmann et al., 1937	50 mice	Stock	---	0.3% in benzene twice weekly[1]	Skin	0	34 alive at 6 mos. 16 alive at 1 year	732 days
Kinosita, 1937	Rabbits	---	---	In olive oil	I.V.	0	---	---
Lees, 1937a	Rats	Lister	---	20 mg. in sesame oil	I.P.	0	---	65 days
Tsunemochi[2]	Rabbits	---	---	In olive oil emulsion	I.V.	0	---	---
Pollia, 1939	41 mice	Inbred albino	---	In water, benzene or sesame oil	Skin	0	---	Avg. 133 days
Hoch-Ligeti, 1940	2 rabbits	---	---	0.05% in aq. gelatine soln. 5 cc. every 1-3 weeks	S.C.	0	---	300 days
Pollia, 1941	5 rats	Wistar	---	5 mg. in sesame oil, weekly	S.C.	0	4 alive at 10 mos.	10 mos.
Miescher, 1942	44 mice	---	---	In vaseline olive oil 3 times a week[3]	Skin, ear	0	1 alive at 1 year	1 year
	--do--	---	---	In vaseline olive oil 3 times a week, 12 applications	--do--	0	4 alive at 1 year	1 year
	--do--	---	---	--do--	--do--	0	---	--do--
	100 mice	---	---	--do--	--do--	0	---	--do--
446.--ANTHRAQUINONE 								
Takizawa, 1940a	Mice	Stock	---	0.1 or 0.25% in benzene every 1 or 2 days	Skin	0[4]	38 alive at 200 days	Over 200 days
Takizawa, 1940b	Mice	---	---	0.25% in benzene every 1 or 2 days	Skin	2 pap.[5]	35 alive at 200 days	Over 200 days
Ito, 1941[6]	Rats	---	---	0.2 g. daily for 90 days	P.O.	Pap.[7]	---	At least 90 days
447.--2-CHLOROFLUORENE 								
Wilson and DeEds, 1946	Rats	---	---	In food	P.O.	0	---	---

1. Synthetic compound used.
2. Unpublished results cited by Kinosita, 1937.
3. To 2 hours before irradiation.
4. 2 papillomas, but similar number in benzene controls. Also 1 lung cancers.
5. Also 2 lung cancers. One papilloma and 2 lung cancers out of 46 controls with benzene alone.
6. Cited by Takizawa, 1941.
7. In gastric mucosa resembling carcinoma.

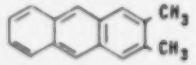
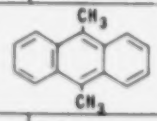
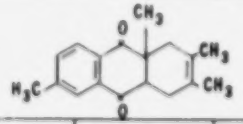
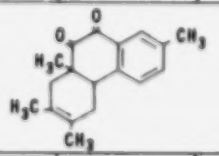
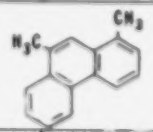
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
447.--2-CHLOROFLUORENE (Continued) 								
Wilson et al., 1947	Rats	---	F	0.16-0.25% in food	P.O.	Tumors[1]	---	100-602 days
448.--CHRYSAROBIN 								
Rosenstirn, 1926	50 mice	White	---	Saturated soln. in alcohol (?)	Skin	0	---	15 mos.
449.--COLCHICINE[6] 								
Haddow et al., 1937	11 rats	Lister	M & F	0.04 mg. in saline, three injections	I.P.	0	---	37 days
Harde, 1939	26 mice	White	---	0.1% soln. weekly or 1:150 to 1:250 in pomade	Skin[2]	6[3]	7 died in 6 mos.	6 mos.
Hamperl, 1946	Mice	---	---	0.5% twice weekly, 1.0% weekly in acetone	Skin	0	---	Over 5 mos.
450.--N-DIACETYL-2-AMINOFLUORENE 								
Morris et al., 1947	Rats --do--	--- ---	--- ---	0.05% in food (4.0-4.7 mgm. daily ingestion) 2% in acetone soln. thrice weekly[5]	P.O. Skin, scapular region	Tumors[4] --do--	--- ---	160 days --do--
451.--9,9'-DIANTHRYL								
Vellu, 1936	Mice	---	---	In benzene	Skin	0	---	10 mos.
452.--9,10-DIBENZYLANTHRACENE 								
Cook, 1932b	10 mice	Stock	---	0.5 and 0.5% in benzene for 475 days	Skin	0	5 alive at 1 year	628 days

1. One with leukemia. One with adenoma of the hypophysis.
2. At base of tail. Preparation also rubbed on lips and small doses given P.O.
3. Little or no reaction at site. 2 pulmonary, 1 thymoma, 1 "follicular epithelioma" 1 papilloma.
4. Kind and location not given.
5. 0.5 mgm. first six months; 1.00 mgm. thereafter.
6. Cf. Cook, 1949.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
453.--3,4-DICARBOMETHOXYPHENANTHRENE 								
Shear, 1941	20 mice	A	M & F	5 mg. crystals, repeated injection	S.C.	0	---	14 mos.
Shear and Leiter, 1941	--do--	A	M	2 plus 5 plus 5 plus 5 mg. crystals	S.C.	0	16 alive at 1 year	14 mos.
454.--β-DIETHYLAMINOETHYLFLOURENE-9-CARBOXYLATE HYDROCHLORIDE 								
Wilson et al., 1947	6 rats	---	F	0.031% in food	P.O.	0	---	431 days
455.--3,4-DIHYDROPHENANTHRENE-1,2-DICARBOXYLIC ANHYDRIDE 								
Shear, 1941**	2 mice	A	M	Crystals, repeated inj.	S.C.	0	---	22 mos.
	9 mice	A	F	--do--	S.C.	0	---	22 mos.
Shear and Leiter, 1941	21 mice	A	---	50 mg. crystals in several inj.	S.C.	0	15 alive at 1 year	19 mos.
456.--7,8-DIHYDROPHENALYL-7-SPIROCYCLOPENTANE 								
Barry et al., 1935	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	4 alive at 1 year	492 days
	10 mice	--do--	---	--do--	--do--	0	10 alive at 1 year	478 days
Bachmann et al., 1937	30 mice	--do--	---	--do--	--do--	0	25 alive at 6 mos. 14 alive at 1 year	567 days
457.--1,2-DIHYDROXY-1,2-DI-α-NAPHTHYLACENAPHTHENE 								
Noble, 1938a	3 rats	Wistar	M	100 mg. crystals	S.C., abdominal wall	0	---	28 days
	3 rats	--do--	F	--do--	--do--	0	---	--do--
Noble, 1939b	6 rats	--do--	M & F	--do--	S.C.	0	---	4 weeks

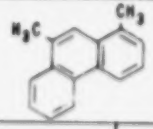
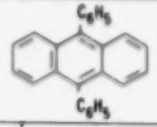
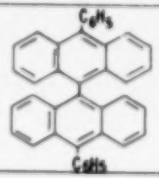
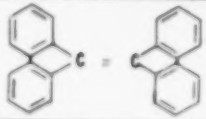
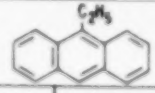
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
458.--1,2-DIHYDROXY-1,2-DIPHENYLACENAPHTHENE 								
Noble, 1939b	6 rats	Wistar	M & F	100 mg. crystals	S.C.	0	---	4 weeks
459.--1,5-DI-ISOPROPENYLANTHRACENE 								
Cook, 1952b	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	2 alive at 6 mos.	288 days
460.--1,2-DIMETHYLANTHRACENE 								
Kennaway, E.L., et al., 1942	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	7 alive at 1 year	396 days
	10 mice	--do--		5 mg. in glycerol or sesame oil, repeated inj.	S.C.	0	3 alive at 1 year	651 days
461.--1,3-DIMETHYLANTHRACENE 								
Kennaway, E.L., et al., 1942	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	4 alive at 1 year	417 days
	--do--	C3H	---	5 mg. in glycerol or sesame oil, repeated inj.	S.C.	0	2 alive at 1 year	435 days
	--do--	Stock	---	20 mg. pellet	S.C.	0[1]	---	557 days
462.--1,4-DIMETHYLANTHRACENE 								
Kennaway, E.L., et al., 1942	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	5 alive at 1 year	508 days
	--do--	C3H	---	5 mg. in glycerol or sesame oil, repeated inj.	S.C.	0	1 alive at 1 year	509 days
	--do--	Stock	---	20 mg. pellets	S.C.		---	495 days

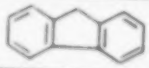
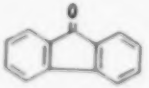
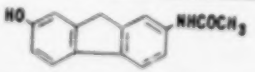
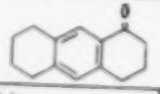
1. In 2 animals examined.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
463.--2,3-DIMETHYLANTHRACENE 								
Kennaway, E.L., et al., 1941	17 mice	Stock	---	0.4% in benzene twice weekly	Skin	0	7 alive at 1 year	515 days
	--do--	C3H	---	5 mg. in glycerol or sesame oil, repeated inj.	S.C.	0	--do--	362 days
	--do--	Stock	---	20 mg. pellets	S.C.	0	---	474 days
464.--9,10-DIMETHYLANTHRACENE 								
Cook and Kennaway, 1941	20 mice	---	---	In benzene	Skin	2 epi., 1 pap.	8 alive at 542 days	614 days
Cook et al., 1941a	Mice	---	---	---	Skin	0[1]	---	---
	Mice	---	---	---	S.C.	--in--	---	---
Kennaway et al., 1942	47 mice	Stock	---	0.4% in benzene twice weekly	Skin	4 epi.,[2]	28 alive at 1 year	669 days
	15 mice	C3H	---	5 mg. in glycerol or sesame oil, repeated inj.	S.C.	0	6 alive at 6 mos. 3 alive at 1 year	442 days
	17 mice	C3H	---	5 mg. in sesame oil, repeated inj.	S.C.	0	5 alive at 450 days	450 days
	17 mice	Stock	---	20 mg. pellets	S.C.	0	4 alive at 1 year	533 days
465.--2,6-DIMETHYL-1,4-NAPHTHOQUINONE-2,3-DIMETHYLBUTADIENE 								
Shear, and Leiter, 1941b**	22 mice	A	F	10 mg. crystals, repeated inj.	S.C.	0	13 alive	18 mos.
466.--2,6-DIMETHYL-3,4-NAPHTHOQUINONE-2,3-DIMETHYLBUTADIENE 								
Shear, and Leiter, 1941b**	20 mice	A	F	10 mg. crystals, repeated inj.	S.C.	0	13 alive	20 mos.
467.--1,9-DIMETHYLPHENANTHRENE 								
Berry et al., 1955	25 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	15 alive at 6 mos. 6 alive at 1 year	490 days

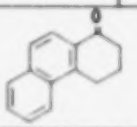
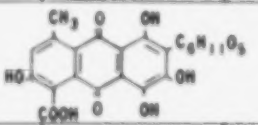
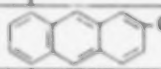
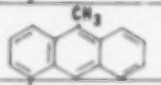
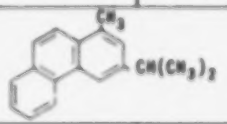
1. No liver lesions.

2. Also 8 lung tumors. One carcinoma of kidneys, one tumor of pylorus and one squamous papilloma of stomach.

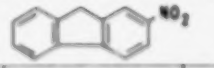
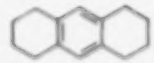
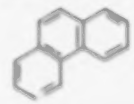
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
467.--1,9-DIMETHYLPHENANTHRENE (Continued) 								
Bachmann et al., 1937	20 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	15 alive at 6 mos., 6 alive at 1 year	550 days
Orr, 1958	10 mice	--do--	---	0.5% in benzene, weekly	--do--	0	---	18 weeks
Noble, 1959b	5 rats	Wistar	M	10 mg. crystals	S.C.	0	---	4 weeks
468.--9,10-Di-α-NAPHTHYLANTHRACENE								
Velluz, 1958	Mice	---	---	In benzene	Skin	0	---	10 mos.
469.--9,10-DIPHENYLANTHRACENE 								
Velluz, 1958	Mice	---	---	In benzene	Skin	0	---	10 mos.
470.--10,10'-DIPHENYL-9,9'-DIANTHRYL 								
Velluz, 1958	Mice	---	---	In benzene	Skin	0	---	10 mos.
471.--bis-DIPHENYLENE-ETHYLENE 								
Barry et al., 1955	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	6 alive at 1 year, 5 alive at 555 days	555 days
472.--9-ETHYLANTHRACENE 								
Velluz, 1958	Mice	---	---	In benzene	Skin	0	---	10 mos.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
473.--FLUORENE 								
Bloch, 1922	Mice	---	---	---	Skin	0	---	---
Kennaway, 1924a	100 mice	---	---	1% in "97% benzol"	Skin	0[1]	---	9 mos.
Kennaway, 1924b	--do--	---	---	--do--	--do--	0	---	--do--
Kennaway, 1924c	Mice	---	---	---	--do--	0	---	---
Kennaway and Hieger, 1930	--do--	---	---	---	--do--	0	---	---
Orr, 1938	15 mice	Stock	---	0.5% in benzene weekly	Skin	0	---	18 weeks
Shear, 1938	17 mice	A	M	10 mg. crystals, 7 inj.	S.C.	0	7 alive at 18 mos.	18 mos.
Allison and DeEds, 1946	Rats	---	---	in food	P.O.	0	---	---
Allison et al., 1947	Rats	---	---	0.062-1.0% in food	P.O.	0	---	104-453 days
	4 rats	---	---	5 mg. in propylene glycol 3 times in a 6-month period	S.C.	0	---	Ca.6 mos.
474.--FLUORENONE 								
Allison et al., 1947	6 rats	---	F	0.25% in diet	P.O.	0	---	600 days
	4 rats	---	F	0.20 mg. in propylene glycol 3 times in 6-month period	S.C.	Tumors[2]	---	373-600 days
475.--HYDRORETENE[3]								
Kennaway, 1950	Mice	---	---	in benzene	Skin	0	---	---
476.--7-HYDROXY-2-ACETAMINOFLUORENE 								
Hoch-Ligeti, 1947c	56 rats	Albino	M & F	0.07% in food	P.O.	0[4]	---	Ca. 500 days
477.--1-KETO-OCTAHYDROANTHRACENE 								
Kennaway, 1950	Mice	---	---	in benzene	Skin	0	---	---
Noble, 1959b	6 rats	Wistar	M & F	100 mg. crystals	S.C.	0	---	4 weeks

1. Distinctly toxic.
2. 2 with breast adenomas.
3. Impure.
4. Retrobulbar hepatomas. 2 adenomas in lungs. First tumor in 380 days.

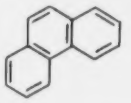
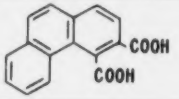
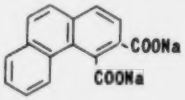
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
478.--1-KETO-1,2,3,4-TETRAHYDROPHENANTHRENE 								
Barry et al., 1935	10 mice	Stock	M	0.5% in benzene, twice weekly	Skin	0	9 alive at 1 year, 5 alive at 583 days	583 days
	10 mice	---do---	F	---do---	---do---	0	10 alive at 6 mos.	535 days
	5 rats	---	---	---	S.C.	2	---	---
Bachmann et al., 1937	10 mice	---do---	F	0.5% in benzene, twice weekly	Skin	0	9 alive at 1 year	653 days
479.--LITHIUM CARMINE[1] 								
Harada, 1951	9 rabbits	---	---	2 to 4% aqueous soln., 5 to 10 cc. every 5-7 days	I.V.	0[2]	---	130 to 529 days
	Mice	---	---	1 to 2% aqueous soln.	I.P.	---do---	---	60 days
480.--2-METHYLANTHRACENE 								
Kennaway and Hieger, 1930	Mice	---	---	---	Skin	0	---	---
481.--9-METHYLANTHRACENE 								
Vellut, 1938	Mice	---	---	In benzene	Skin	0	---	10 mos.
Shear & Leiter, 1940	20 mice	A	M & F	2 plus 5 mg. crystals	S.C.	0	4 alive at 15 mos.	15 mos.
Shear, 1941	20 mice	A	M & F	2 mg. crystals, repeated inj.	S.C.	0	---	15 mos.
482.--METHYLANTHRACENE[3]								
Bloch, 1922	Mice	---	---	---	Skin	0	---	---
483.--1-METHYL-3-ISOPROPYL-PHENANTHRENE[4] 								
Berenblum, unpub. results, 1949	12 mice	Stock	F	1% in benzene applied twice weekly	Skin	1 carc.	All lived	68 weeks
	10 mice	Stock	F	9 mg. in 0.2 ml tricaprylin	S.C.	0	---	40 weeks
	12 mice	Stock	M	2 mg. in 0.2 ml tricaprylin	S.C.	0	---	20 mos.

1. Chiefly di-lithium salt of carminic acid (formula shown).
2. Great proliferation of tissue of spleen.
3. Isomer not stated.
4. Synthesized by R. Robinson and G. Wolf (M.P. 79°C.).

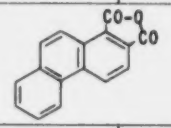
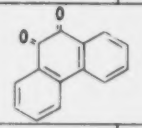
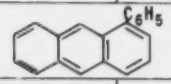
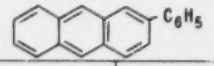
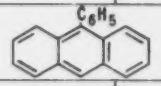
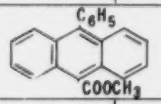
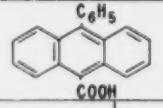
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
484.--2-NITRO-FLUORENE 								
Morris, et al., 1967	Rats	---	---	0.05% in food (4.0-4.7 daily ingestion)	P.O.	Tumors[1]	---	160 days
	---do---	---	---	2% acetone soln., thrice weekly, 0.5 mgm. first 6 mos. 1.00 mgm. thereafter	Skin, scapular region	---do---	---	160 days
485.--OCTAHYDROANTHRACENE 								
Kennaway, 1930	Mice	---	---	In benzene	Skin	0	---	---
Kennaway and Hieger, 1930	---do---	---	---	---	---do---	0	---	---
486.--OCTAHYDROPHENANTHRENE[2] $C_{14}H_{18}$								
Kennaway, 1930	Mice	---	---	In benzene	Skin	0	---	---
487.--PHENANTHRENE 								
Bloch, 1942	Mice	---	---	---	Skin	0	---	---
Kennaway, 1924a	100 mice	---	---	1% in "90% benzol"	Skin	0	---	9 mos.
Kennaway, 1924b	---do---	---	---	---do---	---do---	0	---	9 mos.
Kennaway, 1924c	Mice	---	---	---	---do---	0	---	---
Malkin et al., 1927	---do---	---	---	---	---do---	0	---	2 years
Kennaway and Hieger, 1930	Mice	---	---	---	---do---	0	---	---
Loss, 1917a	Rats	Lister	---	20 mg. in sesame oil	I.P.	0	---	65 days
Noble, 1939a	5 rats	Wistar	M	10 mg. crystals	S.C. abdominal wall	0	---	28 days
	5 rats	---do---	M	50 mg. crystals	---do---	0	---	4 weeks
Orr, 1939	15 mice	Strain	---	0.5% in benzene weekly	Skin	0	---	18 weeks
Noble, 1939a	5 rats	Wistar	M	10 mg. crystals	S.C.	0	---	4 weeks
Hoch-Ligeti, 1940	1 rabbit	---	---	0.05% in aq. gelatine soln. 5 cc. every 1 to 3 weeks	S.C.	0	---	300 days
White A., and White J., 1940	15 rats	---	M & F	30 and 40 mg. in sesame oil	I.P.	0	---	53 days

1. Kind and location not given.

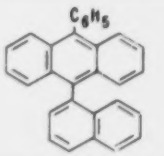
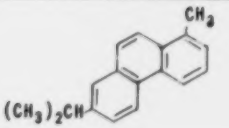
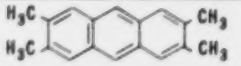
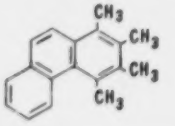
2. Impure.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
487.--PHENANTHRENE (Continued) 								
Hoch-Ligeti, 1941	1 rabbit	---	---	0.05% in colloidal 1% aq. gelatine soln. 5 cc. every 4-8 weeks	S.C.	0	---	Long period
Marron, 1941	25 rats	Sprague-Dawley	M & F	Up to 6 mg. (total dose) in lard during 3 weeks	I.P.	---	---	---
	20 rats	Inbred	---	6 mg. in lard twice	I.P.	0	---	9 mos.
	10 rats	--do--	---	20 mg. (total dose) in lard during 30 days	I.P.	0	---	120 days
Locatelli, 1947	Rats	---	---	20 mg. in lard (sometimes crystals used).	S.C.	0[1]	---	5 days - 4 mos.
	Rabbits	---	---	--do--	--do--	--do--	---	--do--
488.--PHENANTHRENE CHOLEIC ACID[2]								
Carruthers, 1942	Mice	C57, black	---	1 mg. in aq. soln. pH8 2 times weekly	S.C.	0	---	14 weeks
489.--PHENANTHRENE-3,4-DICARBOXYLIC ACID 								
Shear, 1941	20 mice	A	M & F	5 mg. crystals, repeated inj.	S.C.	0	---	13 mos.
Shear and Leiter, 1941b	20 mice	A	M & F	5 plus 5 plus 5 plus 5 mg. crystals	S.C.	0	15 alive at 9 mos. 6 alive at 12 mos.	14 mos.
490.--PHENANTHRENE-3,4-DICARBOXYLIC ACID, DISODIUM SALT 								
Shear and Leiter, 1941b	10 mice	A	---	10 plus 10 plus 5 mg. crystals	S.C.	0[3]	7 alive at 1 year	1 year
	20 mice	A	M & F	40 mg. crystals repeated inj. plus 65 mg. in aq. soln.	S.C.	0	12 alive at 9 mos. 6 at 1 year	14 mos.
	10 mice	Inbred	M & F	Ca. 2 mg. in aq. soln. daily	S.C. P.O.	0 0	7 alive at 9 mos.	1 year
Shear, 1941**	10 mice	A	M	10 mg. crystals, repeated inj.	S.C.	0[4]	---	1 year
	--do--	A	M	5 mg. crystals plus 12 mg. in aq. soln. repeated inj.	--do--	0	---	19 mos.
	10 mice	A	F	--do--	--do--	0	---	--do--
	--do--	C3H	M	--do--	--do--	0	---	--do--
	--do--	A	M & F	0.33% in water	P.O.	0	---	1 year

1. Changes in mitocrondria of liver cells.
2. Phenanthrene to desoxycholic acid in the ratio of 1:3.
3. One renal epithelial tumor..
4. Carcinoma of kidney; in one case.

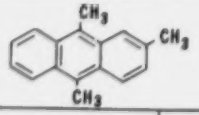
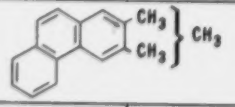
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
491.--PHENANTHRENE-1,2-DICARBOXYLIC ANHYDRIDE 								
Shear, 1941**	4 mice	A	M	Crystals, repeated inj.	S.C.	0	---	16 mos.
	9 mice	A	F	--do--	--do--	0	---	--do--
Shear and Leiter, 1940b	12 mice	A	---	10 plus 10 plus 10 plus 10 mg. crystals	S.C.	0	11 alive at 9 mos., 5 alive at 12 mos.	18 mos.
492.--PHENANTHRENEQUINONE 								
Takizawa, 1940b	Mice	---	---	0.25% in benzene every 1 or 2 days	Skin	1 epi.[1] 2 pap.	36 alive at 200 days	Over 200 days
Takizawa, 1940c	Mice	Stock	---	0.1 or 0.25% in benzene every 1 or 2 days	Skin	5 pap.[2]	--do--	--do--
493.--1-PHENYLANTHRACENE 								
Cook, 1932b	10 mice	Stock	---	0.3 to 0.5% in benzene twice weekly for 531 days	Skin	0	7 alive at 1 year	768 days
494.--2-PHENYLANTHRACENE 								
Cook, 1932b	10 mice	Stock	---	0.5% in benzene	Skin	0	4 alive at 1 year	720 days
495.--9-PHENYLANTHRACENE 								
Velluz, 1938	Mice	---	---	1% in benzene	Skin	0	---	10 mos.
496.--9-PHENYL-10-CARBOMETHOXYANTHRACENE 								
Velluz, 1938	Mice	---	---	In benzene	Skin	0	---	10 mos.
497.--9-PHENYL-10-CARBOXYANTHRACENE 								
Velluz, 1938	Mice	---	---	In benzene	Skin	0	---	10 mos.

1. Also 2 lung cancers; one papilloma and 2 lung cancers out of 46 benzene controls. 2. 1 before 200 days.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
498.--9-PHENYL-10-α-NAPHTHYLANTHRACENE 								
Velluz, 1938	Mice	---	---	In benzene	Skin	0	---	10 mos.
499.--POLYACENAPHTHYLENE $(C_{12}H_8)_{22}$								
Cook, 1932b	10 mice	Stock	---	2% in benzene	Skin	0	6 alive at 6 mos.	308 days
500.--RETENE 								
Bloch, 1922	Mice	---	---	---	Skin	0	---	---
Kennaway, 1924a	100 mice	---	---	In sebaceous material from dermoids	--do--	0	---	6 mos.
Kennaway, 1924b	--do--	---	---	1% in "90% benzol"[1]	--do--	0	---	7 mos.
Kennaway, 1924c	Mice	---	---	---	--do--	0	---	---
Kennaway and Hieger, 1930	Mice	---	---	---	Skin	0	---	---
501.--2,3,6,7-TETRAMETHYLANTHRACENE 								
Badger et al., 1942	10 mice	C3H	---	0.3% susp. in acetone twice weekly	Skin	0	5 alive at 6 mos.	359 days
	10 mice	--do--	---	5 mg. in glycerol, repeated injections	S.C.	0	7 alive at 6 mos. 3 alive at 1 year	474 days
502.--1,2,3,4-TETRAMETHYLPHENANTHRENE 								
Badger et al., 1942	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	1 epi[2] 4 pap.	9 alive at 6 mos. 5 alive at 1 year	486 days
	20 mice	C3H	---	5 mg. in glycerol, repeated injection	S.C.	0	5 alive at 6 mos. 2 alive at 1 year	528 days

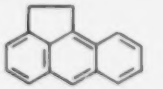
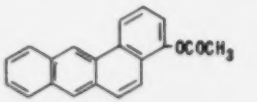
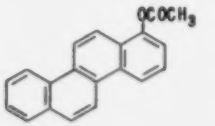
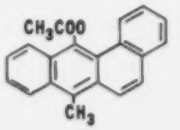
1. Compound "very pure".

2. Within 399 days. Also 9 lung adenomas.

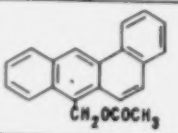
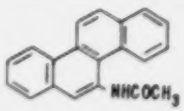
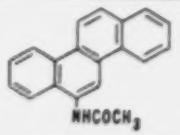
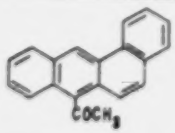
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
503.--2,9,10-TRIMETHYLANTHRACENE 								
Bradbury et al., 1941	15 mice	Inbred	---	2 mg. in sesame oil	S.C.	0	All alive in 8 mos.	8 mos.
504.--2,3,?-TRIMETHYLPHENANTHRENE 								
Shear, 1941	10 mice	A	M	0.5 mg. in lard[1]	S.C.	0	---	16 mos.
Shear and Leiter, 1941b	10 mice	A	---	0.5 mg. in lard	S.C.	0	6 alive at 1 year 4 alive at 17 mos.	17 mos.

1. M.p. 148.9°.

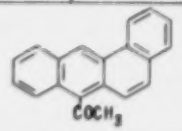
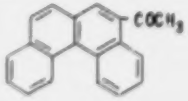
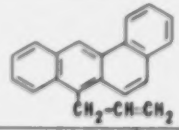
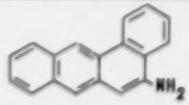
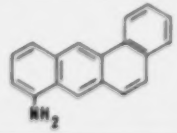
B.--ORGANIC COMPOUNDS 5.--TETRACYCLIC

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
505.--ACEANTHRENE 								
Shear[1]	Mice	—	—	—	S.C.	0	—	18 mos.
Shear, 1938a	9 mice	A	F	5 mg. crystals	S.C.	0	2 alive at 20 mos.	20 mos.
506.--4'-ACETOXY-1,2-BENZANTHRACENE[2] 								
Berenblum, unpub. results, 1949	12 mice	Stock	M	2 mg. in 0.2 ml. tricaprylin	S.C.	0	—	23 weeks
507.--1-ACETOXYCHRYSENE[3] 								
Berenblum, unpub. results, 1949	12 mice	Stock	M	1.2 mg. (emulsion) in 0.2 ml. tricaprylin	S.C.	0[4]	—	94 weeks
508.--9-ACETOXY-10-METHYL-1,2-BENZANTHRACENE 								
Shear, 1941**	20 mice	A	M & F	5 mg. crystals, repeated injections	S.C.	0	—	17 mos.
Shear and Leiter, 1940	20 mice	A	M & F	5 plus 3.5 mg. crystals	S.C.	1[5]	—	17 mos.

1. Cited by Fieser and Hershberg, 1937a.
2. Synthesized by R. Schoental.
3. Synthesized by J. W. Cook and R. Schoental (J.C.S., 1945) m.p. 235-236C.
4. One animal had carcinoma in the thoracic cavity invading heart, lung and pleura with metastases in kidney.
5. At one year.

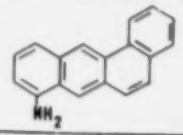
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
509.--10-ACETOXYMETHYL-1,2-BENZANTHRACENE 								
Badger and Cook, 1940[1]	Mice	---	---	---	---	Tumors	---	---
Badger et al., 1940	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	8 epi. 3 pap.	---	321 days
	10 mice	Stock	---	5 mg. in sesame oil, repeated injections	S.C.	8 sarc.	---	126 days
Cook et al., 1940a	Mice	---	---	---	Skin	0[2]	---	---
	--do--	---	---	---	S.C.	0[3]	---	---
Shear and Leiter, 1940	10 mice	A	M	5 plus 5 plus 5 mg. crystals	S.C.	8[4]	---	15 mos.
Shear, 1941***	10 mice	A	M	5 mg. crystals, repeated injections	S.C.	8	---	10 mos.
510.--5-ACETYLAMINOCHRYSENE[5] 								
Berenblum, unpub. results, 1949	10 mice	Stock	M	2 mg. (suspension) in 0.2 ml. tricaprylin	S.C.	0	---	40 weeks
511.--6-ACETYLAMINOCHRYSENE[5] 								
Berenblum, unpub. results, 1949	10 mice	Stock	M	2 mg. (suspension) in 0.2 ml. tricaprylin	S.C.	0[6]	---	95 mos.
512.--10-ACETYL-1,2-BENZANTHRACENE 								
Cook et al., 1940a	Mice	---	---	---	Skin	0[7]	---	---
	Mice	---	---	---	S.C.	0[8]	---	---

1. Citing unpublished work of E. L. Kennaway.
2. No liver lesions in 10 livers examined.
3. No liver lesions in 9 livers examined.
4. First in 6 months.
5. Synthesized by J. W. Cook and R. Schoental (J.C.S., 1945).
6. Several had lung tumors.
7. No liver lesions in 4 livers examined.
8. No liver lesions in 1 liver examined.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
512.--10-ACETYL-1,2-BENZANTHRACENE (Continued) 								
Badger et al., 1942	20 Mice	Stock	---	0.5% in benzene twice weekly	Skin	0	15 alive at 6 mos. 11 at 1 year	797 days
513.--2-ACETYL-3,4-BENZPHENANTHRENE 								
Badger et al., 1942	10 mice	C3H	---	0.5% in benzene twice weekly	Skin	2 epi.	6 alive at 6 mos.	245 days
	--do--	--do--	---	5 mg. in glycerol, repeated injections	S.C.	2 pap.[1] 1 sarc.[2]	1 alive at 6 mos.	236 days
514.--10-ALLYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940	20 mice	A and C3H	M	5 plus 5 plus 5 mg. crystals	S.C.	0	---	13 mos.
515.--3-AMINO-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940	20 mice	M (leaden)	M & F	10 plus 5 plus 5 mg. crystals	S.C.	0	9 alive at 9 mos. 3 alive at 12 mos.	14 mos.
516.--5-AMINO-1,2-BENZANTHRACENE 								
Cook et al., 1940a	Mice	---	---	---	S.C.	0[3]	---	---

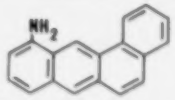
1. First within 255 days. One stomach papillomas. One papillomas possibly malignant.
2. Within 256 days.
3. No liver lesions in one liver examined.

516.--5-AMINO-1,2-BENZANTHRACENE (Continued)



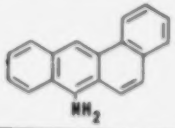
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Badger et al., 1942	10 mice	C3H	---	0.3% in benzene twice weekly	Skin	0[1]	9 alive at 6 mos.	416 days
	10 mice	--do--	---	5 mg. in sesame oil, repeated injections	S.C.	1 sarc.[2]	3 alive at 1 year 6 alive at 6 mos.	332 days

517.--8-AMINO-1,2-BENZANTHRACENE



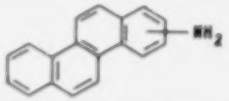
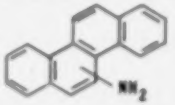
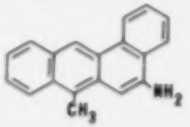
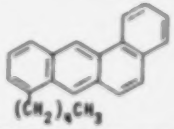
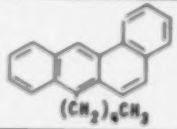
Dunlap and Warren, 1946	5 mice	C3H	M & F	1.0 mg. in tricaprylin. Single injection	S.C.	0[3]	3 alive at 6 mos.	At least 6 mos.
	5 mice	Swiss	M & F	1.0 mg. in tricaprylin. Single injection	S.C.	0	5 alive at 6 mos.	--do--
	5 mice	--do--	--do--	2.0 mg. in tricaprylin. Single injection	--do--	0	1 alive at 6 mos.	--do--

518.--10-AMINO-1,2-BENZANTHRACENE

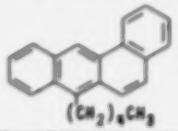
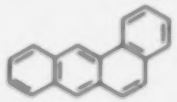


Badger et al., 1940	Mice	Stock	---	---	Skin	0	---	275 days
	10 mice	---	---	5 mg. in sesame oil, repeated injections	S.C.	2 sarc.[4]	---	230 days
Cook et al., 1940a	Mice	---	---	---	S.C.	0[5]	---	---
Shear and Leiter, 1940	20 mice	A	M & F	5 plus 5 plus 5 mg. crystals	S.C.	1[6]	---	At least 12 mos.
	20 mice	A	--do--	6 mg. (over 5 injections) crystals	S.C.	0	---	18 mos.
	20 mice	Mileaden	--do--	--do--	S.C.	1[7]	---	--do--
Shear, 1941**	20 mice	A	M & F	5 mg. crystals, repeated injections	S.C.	1	---	11 mos.
Shear, 1941**	20 mice	A	M & F	1 mg. crystals, repeated injections	S.C.	1	---	17 mos.
	20 mice	A	--do--	--do--	S.C.	0	---	17 mos.

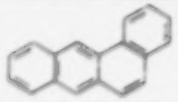
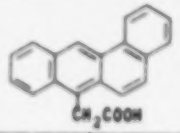
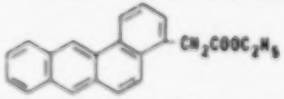
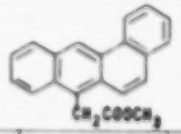
1. One possible early papilloma.
2. Within 200 days.
3. One pulmonary adenoma at 345 days.
4. And 2 others possibly malignant.
5. No liver lesions in 2 livers examined.
6. In male at 8 months.
7. In female at 12 months.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
519.--x-AMINOCHRYSENE 								
Domagk, 1938	Mice	---	---	1% in water, 50 applications	Skin	0	---	10 mos.
520.--y-AMINOCHRYSENE 								
Domagk, 1938	Mice	---	---	1% in solvent M and in water, 41 applications	Skin	0	---	---
521.--3-AMINO-10-METHYL-1,2-BENZANTHRACENE 								
Dunlap and Warren, 1946	20 mice	C3H	M & F	2.0 mgm. once in tricaprylin	S.C.	0	11 lived 6 mos.	At least 6 mos.
522.--2-AMINOPYRENE								
Domagk, 1938	Mice	---	---	1% in water, 50 applications	Skin	0	---	10 mos.
523.--5-n-AMYL-1,2-BENZANTHRACENE 								
Badger et al., 1940	20 mice	---	---	0.3% in benzene twice weekly	Skin	7 epi. 3 pap.	---	454 days
	10 mice	---	---	5 mg. in sesame oil, repeated injections	S.C.	0	---	460 days
Cook et al., 1940a	Mice	---	---	---	Skin	0[1]	---	---
	--do--	---	---	---	S.C	0[1]	---	---
Cook and Robinson, (Mrs. A. M.) 1940a	Mice	---	---	Diluted soln. in benzene	Skin	2	---	294 days
524.--10-n-AMYL-1,2-BENZANTHRACENE 								
Shear, 1941*	20 mice	A	M & F	5 mg. crystals, repeated injections	S.C.	0	---	14 mos.

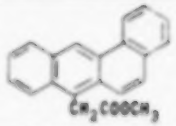
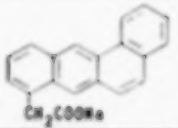
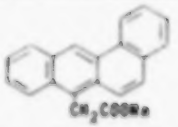
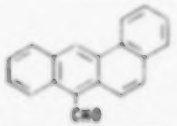
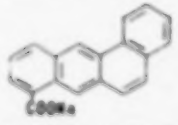
1. No liver lesions in 7 livers examined.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
524.--10-n-AMYL-1,2-BENZANTHRACENE (Continued) 								
Shear and Leiter, 1940	20 mice	A	M & F	5 plus 5 plus 5 mg. crystals	S.C.	0	11 alive at 14 mos.	14 mos.
525.--1,2-BENZANTHRACENE 								
Kennaway, 1930	50 mice	---	---	In benzene	Skin	0[1]	---	---
Cook, 1933a	80 mice	---	---	---	Skin	1 epi.	---	---
Barry et al., 1935	50 mice	Stock	---	2% in benzene[2]	Skin	0	13 alive at 6 mos. 2 alive at 1 year	574 days
	50 mice	--do--	---	(3)	--do--	1 epi.	10 alive at 6 mos. 7 alive at 1 year	584 days
	10 mice	--do--	---	4 mg. in lard	S.C.	0	6 alive at 1 year	1 year
Boyland and Burrows, 1935	10 rats	---	---	0.05% aqueous colloidal soln., 2 cc. weekly	S.C.	0	1 alive at 18 mos.	103 weeks
Krieger, 1936	26 rats	Stock	---	0.05 to 9 mg. in lard	S.C.	0	Killed at intervals	30 weeks
	Mice	---	---	0.3% in benzene twice weekly for 32 weeks	Skin	0	---	40 weeks
Lees, 1937a	Rats	Lister	---	20 mg. in sesame oil	I.P.	0	---	65 days
Orr, 1938	15 mice	Stock	---	0.3% in benzene weekly	Skin	0	---	18 weeks
	10 mice	--do--	---	0.3% in acetone weekly	--do--	0	---	At least 21 weeks
Orr, 1939	(4)							
Shear, 1941	20 mice	A	M & F	5 mg. crystals, repeated injections	S.C.	0	---	16 mos.
Wolfe and Bryan, 1939	2 rats	---	---	5 mg. in sesame oil daily	Inj.	0	---	18 days
Andervont and Shimkin, 1940	10 mice	A	---	0.25 mg. in aq. susp., single injection	I.V.	0	---	20 weeks
	10 mice	A	M & F	0.5 mg. in tricaprylin	S.C.	0[5]	---	14 weeks

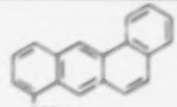
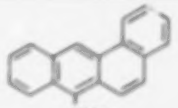
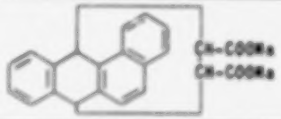
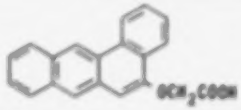
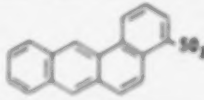
1. Transitory papilloma in one animal.
2. Not especially purified.
3. Substance purified through the picrate.
4. See 3,4-benzpyrene.
5. No more lung tumors than in controls.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
525.--1,2-BENZANTHRACENE (Continued) 								
Much-Ligeti, 1960	2 rabbits	---	---	0.005 in aq. gelatin soln, 5 c.c., every 1 to 1 weeks	S.C.	0	---	500 days
Maurer et al., 1961	Rats	---	---	1 mg. in coll. susp. in aq. gelatin soln, weekly	I.P.	0	---	8 weeks
Berenblum, 1941a	20 mice	---	---	Saturated soln. in acetone weekly	Soln	0	16 alive at 16 weeks	At least 16 weeks
Much-Ligeti, 1961	1 rabbit	---	---	0.005 in colloidal 1% aq. gelatin soln, 5 cc. every 6-8 weeks	S.C.	0	---	Long period
Shear and Leiter, 1941b	20 mice	A	M & F	5 mg. plus 5 mg. crystals	S.C.	0	10 alive at 15 mos.	18 mos.
Saito, T. W. and Eschenbrenner, 1941a	6 rats	Osborne-Mendel	M & F	0.05% in food	F.O.	Tumors[1]	---	At least 16 mos.
Saito, T. W. and Eschenbrenner, 1941b	--do--	--do--	--do--	--do--	--do--	--do--	--do--	--do--
526.--1,2-BENZANTHRACENE-10-ACETIC ACID 								
Shear, 1939	Mice	---	---	Crystals	S.C.	0	---	15 mos.
Dansi et al., 1940	10 rats	---	---	10 mg. in glycerol	S.C.	0	---	8-12 mos.
Shear and Leiter, 1941b [2]	10 mice	A	M	5 mg. crystals, thrice	S.C.	0	---	15 mos.
527.--1,2-BENZANTHRACENE-4'-ACETIC ACID, ETHYL ESTER 								
Dansi et al.,	6 rats	---	---	7 mg. in lard once	S.C.	0	---	10-12 mos.
528.--1,2-BENZANTHRACENE-10-ACETIC ACID, METHYL ESTER 								
Shear, 1941	10 mice	A	M	5 mg. crystals, repeated injections	S.C.	4	---	11 mos.

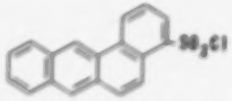
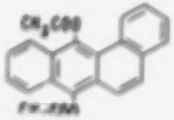
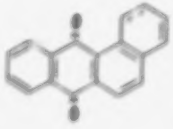
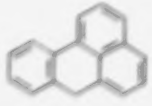
1. Hepatomas.

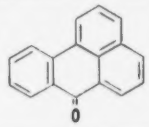
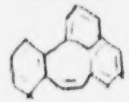
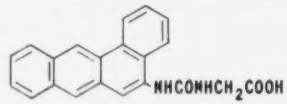
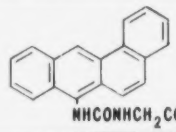
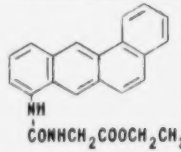
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
528.--1,2-BENZANTHRACENE-10-ACETIC ACID, METHYL ESTER (Continued) 								
Shear and Leiter, 1940	10 mice	A	M	5 mg. crystals thrice	S.C.	6[1]	2 alive at 16 mos.	16 mos.
529.--1,2-BENZANTHRACENE-5-ACETIC ACID, SODIUM SALT 								
Badger et al., 1940	10 mice	Stock	---	10 mg. in water, 4 injections	S.C.	0	---	246 days
Cook et al., 1940a	mice	---	---	---	S.C.	0[2]	---	---
530.--1,2-BENZANTHRACENE-10-ACETIC ACID, SODIUM SALT 								
Danol et al., 1940	10 rats	---	---	30 mg. in water. 1 cc. injection, 3 days apart, thrice. 3 cc. injection, 15 days apart, thrice	S.C.	3[3]	---	10-12 mos.
	10 mice	---	---	3 mg. in water. 1 injection	I.V.	0	---	Ca. 14 mos
531.--1,2-BENZANTHRACENE-10-ALDEHYDE 								
Shear and Leiter, 1940	20 mice	A	M & F	2 plus 5 mg. crystals	S.C.	10[4]	2 alive at 10 mos.	11 mos.
Shear, 1941[5]	20 mice	A	M & F	2 mg. crystals, repeated injections	S.C.	7	---	11 mos.
532.--1,2-BENZANTHRACENE-5-CARBOXYLIC ACID, SODIUM SALT 								
Badger et al., 1940	30 mice	---	---	0.3% in alcohol twice weekly	Skin	0[3]	---	612 days
	10 mice	---	---	0.3% in water	S.C.	0	---	551 days
	--do--	---	---	--do--	I.P.	0	---	--do--

1. First at 8 months.
2. No liver lesions.
3. Pulmonary.
4. First at 7 months.
5. One epi. of neck.

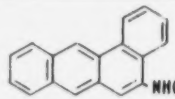
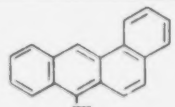
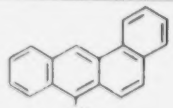
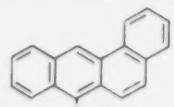
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
532.--1,2-BENZANTHRACENE-5-CARBOXYLIC ACID, SODIUM SALT (Continued) 								
Cook et al., 1940a	Mice --do--	--- ---	--- ---	--- ---	Soln S.C.	0[1] 0[1]	--- ---	--- ---
533.--1,2-BENZANTHRACENE-10-CARBOXYLIC ACID, SODIUM SALT 								
Dansi et al., 1958	15 mice	Albino	---	0.2% in water, i.c. about once every 3 days	Inj.	0	---	Over 3.5 mos.
534.--1,2-BENZANTHRACENE-9,10-ENDO-α,β-SUCCINIC ACID, SODIUM SALT 								
Parsons and Warren, 1941	11 mice 10 mice	CBA Stock	--- ---	2.5% soln., 0.5-0.6 cc. thrice weekly[1] --do--	S.C. S.C.	2 sarc.[2] 1 sarc.	--- 4 died in 75 days[3]	1 year 1 year
535.--1,2-BENZANTHRACENE-3-HYDROXYACETIC ACID 								
Shear and Leiter, 1940	10 mice	Wileaden	M	1 plus 1 mg. in lard	S.C.	0	4 alive at 16 mos.	16 mos.
Shear, 1941[4]	10 mice	W	M	1 mg. in lard, repeated injections	S.C.	0	---	--do--
536.--1,2-BENZANTHRACENE-4-SULFONIC ACID, ETHYL ESTER 								
Dansi et al., 1960	7 rats	---	---	10 mg. in lard, 1 injection	S.C.	0	---	10-12 mos.
537.--1,2-BENZANTHRACENE-4-SULFONIC ACID, POTASSIUM SALT								
Dansi et al., 1960	10 rats	---	---	8-10 mg. in lard	S.C.	0	---	Up to 14 mos.

1. 5 animals irradiated with X-rays.
2. In irradiated mice; first at 229 days.
3. In an irradiated mouse; at 102 days.
4. Irradiated mice.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
538.--1,2-BENZANTHRACENE-4'-SULFONYL CHLORIDE 								
Danoi et al., 1940	10 rats	---	---	15 mg. in oil, once	S.C.	0	---	10-12 mos.
539.--1,2-BENZANTHRA-9,10-HYDROQUINONE DIACETATE 								
Shear and Leiter, 1940	10 mice	C3H	M	5 plus 5 plus 5 mg. crystals	S.C.	0	5 alive at 9 mos.	13 mos.
Shear, 1941	10 mice	C3H	M	5 mg. crystals, repeated injections	S.C.	0	---	1 year
540.--1,2-BENZANTHRA-9,10-QUINONE 								
Kennaway, 1930	Mice	---	---	In benzene	Skin	0	---	---
Shear, 1941**	10 mice	C3H	M	5 mg. crystals, repeated injections	S.C.	0	---	14 mos.
Shear and Leiter, 1940	10 mice	C3H	M	5 plus 5 plus 5 mg. crystals	S.C.	0	7 alive at 1 year	14 mos.
541.--BENZANTHRENE 								
Berry et al., 1955	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	14 alive at 6 mos. 9 alive at 1 year	600 days

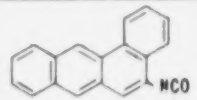
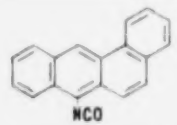
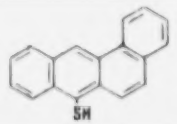
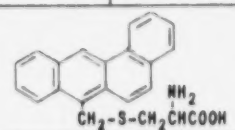
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
542.--1,9-BENZANTHRONE  								
Morosenskaya, 1940	50 mice	White	---	0.5% benzene soln. per day (70-75 mg. per mouse total dose)	S.C.	Tumors[1]	13 alive at 6 mos.	At least 6 mos.
	32 mice	--do--	---	0.5% in olive oil, 5 injections 10-15 days apart		Tumors[2]	16 alive at 6 mos.	At least 6 mos.
543.--1,2-BENZANTHRYL-3-CARBAMIDOACETIC ACID 								
Dunlap and Warren, 1946	30 mice	Swiss	M & F	1 mg. in water 3 times	S.C.	0[3]	20 alive at 310 days	At least 6 mos.
	15 mice	--do--	--do--	1 mg. in water once	--do--	0[4]	9 alive at 6 mos.	--do--
	15 mice	C3H	--do--	2.0 mg. in tricaprylin once	--do--	0	13 alive at 6 mos.	--do--
544.--1,2-BENZANTHRYL-10-CARBAMIDOACETIC ACID 								
Dunlap and Warren, 1946	10 mice	Swiss	M & F	1.0 mg. in water 4 times	S.C.	0	6 alive at 643 days	At least 6 mos.
	15 mice	--do--	--do--	1.0 mg. in water 4 times	--do--	0	6 alive at 6 mos.	At least 6 mos.
	15 mice	--do--	--do--	1.0 mg. in water once	--do--	0	8 alive at 6 mos.	At least 6 mos.
	10 mice	C3H	--do--	2.0 mg. in tricaprylin once	--do--	0	--do--	--do--
545.--1,2-BENZANTHRYL-10-CARBAMIDOACETIC ACID, ETHYL ESTER 								
Dunlap and Warren, 1946	20 mice	Swiss	M & F	2.0 mgm. in tricaprylin once	S.C.	0	14 alive at 6 mos.	At least 6 mos.
	10 mice	C3H	--do--	--do--	--do--	0	6 alive at 6 mos.	--do--

1. One lung tumor. One with tumor of thyroid gland.
2. One with lung tumors. One with jaw tumor.
3. 2 mice with pulmonary adenoma at 394 and 681 days.
4. Mice with pulmonary adenoma at 310 and 569 days.

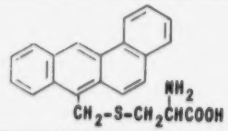
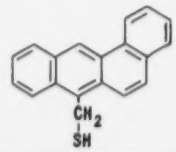
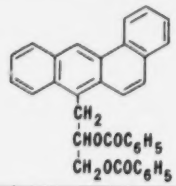
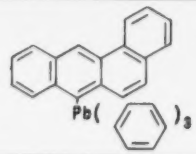
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
546.--ε-(1,2-BENZANTHRYL-3-CARBAMIDO)-CAPROIC ACID  **NHCONH$(CH_2)_5$COOH**								
Dunlap and Warren, 1946	25 mice	Swiss	M & F	0.5 mgm. in water 3 times	S.C.	0[1]	5 alive at 6 mos.	At least 6 mos.
	10 mice	--do--	--do--	1.0 in water once	I.P.	0	4 alive at 6 mos.	At least 6 mos.
	10 mice	C3H	--do--	2.0 in tricaprylin once	S.C.	0	9 alive at 6 mos.	--do--
547.--ε-(1,2-BENZANTHRYL-10-CARBAMIDO)-CAPROIC ACID  **NH** **CONH$(CH_2)_5$COOH**								
Dunlap and Warren, 1946	25 mice	Swiss	M & F	0.5 mgm. in water 3 times	S.C.	0[2]	6 alive at 6 mos.	At least 6 mos.
	15 mice	--do--	--do--	1.0 mgm. in water once	I.P.	--do--	7 alive at 6 mos.	--do--
	15 mice	C3H	--do--	2.0 mgm. in tricaprylin	S.C.	--do--	14 alive at 6 mos.	--do--
548.--1,2-BENZANTHRYL-10-CARBAMIDO-ETHANOL  **NH** **CONHCH$_2$CH$_2$OH**								
Dunlap and Warren, 1946	25 mice	Swiss	M & F	1.0 mgm. in tricaprylin once	S.C.	0[2]	9 alive at 6 mos.	At least 6 mos.
	10 mice	C3H	M & F	2.0 mgm. in tricaprylin once	--do--	0	--do--	--do--
549.--1,2-BENZANTHRYL-10-S-dl-CYSTEINE  **S** **NH$_2$** **CH$_2$CHCOOH**								
Dunlap and Warren, 1946	20 mice	C3H	M & F	2.0 mgm. in tricaprylin once	S.C.	0	11 alive at 6 mos.	At least 6 mos.

1. 2 mice with pulmonary adenoma at 253 days.

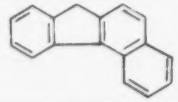
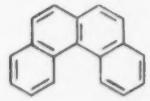
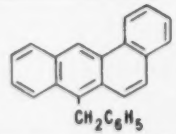
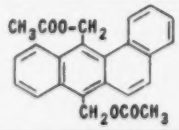
2. One mouse with pulmonary adenoma.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
550.--1,2-BENZANTHRYL-3-ISOCYANATE 								
Dunlap and Warren, 1946	10 mice	Swiss	M & F	2.0 mgm. in tricaprylin once	S.C.	0	7 alive at 6 mos.	At least 6 mos.
	5 mice	--do--	--do--	4.0 mgm. in tricaprylin once	S.C.	0[1]	5 alive at 6 mos.	--do--
	10 mice	C3H	--do--	1.0 mgm. in water once	--do--	0	9 alive at 6 mos.	--do--
	15 mice	Swiss	--do--	--do--	--do--	0[1]	14 alive at 6 mos.	--do--
551.--1,2-BENZANTHRYL-10-ISOCYANATE 								
Dunlap and Warren, 1946	10 mice	Swiss	M & F	2.0 mg. in tricaprylin once	S.C.	0[1]	6 alive at 6 mos.	At least 6 mos.
	5 mice	--do--	--do--	4.0 mg. in tricaprylin once	--do--	0[3]	1 alive at 6 mos.	--do--
	10 mice	C3H	--do--	1.0 mg. in water once	--do--	0	9 alive at 6 mos.	--do--
	15 mice	Swiss	--do--	1.0 mg. in tricaprylin once	--do--	1[2]	14 alive at 532 days	--do--
552.--1,2-BENZANTHRYL-10-MERCAPTAN 								
Dunlap and Warren, 1946	10 mice	Swiss	M & F	4.0 mgm. in tricaprylin once	S.C.	0[1]	10 alive at 6 mos.	At least 6 mos.
	20 mice	--do--	--do--	2.0 mgm. in tricaprylin once	--do--	--do--	19 alive at 6 mos.	--do--
	10 mice	C3H	--do--	--do--	--do--	1	9 alive at 281 days	--do--
	20 mice	--do--	--do--	--do--	--do--	2	16 alive at 155 days	--do--
553.--1,2-BENZANTHRYL-10-METHYL-S-1-CYSTEINE 								
Dunlap and Warren, 1946	15 mice	Swiss	M & F	2.0 mgm. in glycerine once	S.C.	0	7 alive at 6 mos.	At least 6 mos.

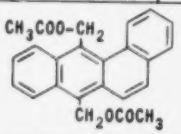
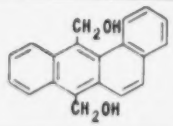
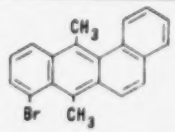
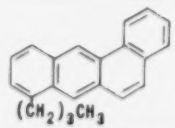
1. One mouse with pulmonary adenoma.
2. Pulmonary adenoma.
3. One mouse with pulmonary adenoma; one with epidermoid carcinoma of the bladder at 123 days.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
553.--1,2-BENZANTHRYL-10-METHYL-S-1-CYSTEINE (Continued) 								
Dunlap and Warren, 1946 (cont'd.)	10 mice	C3H	M & F	2.0 mgm. in tricaprylin once	S.C.	0	7 alive at 6 mos.	At least 6 mos.
554.--1,2-BENZANTHRYL-10-METHYL MERCAPTAN 								
Dunlap and Warren, 1946	15 mice	Swiss	M & F	2.0 mgm. in tricaprylin once	S.C.	0[1]	10 alive at 6 mos.	At least 6 mos.
	10 mice	C3H	M & F	--do--	--do--	1[2]	9 alive at 241 days	--do--
555.--3-(1,2-BENZ-10-ANTHRYL)-1,2-PROPYLENEGLYCOL DIBENZOATE 								
Shear and Leiter, 1940	10 mice	A	M	5 plus 5 plus 5 mg. crystals	S.C.	0	---	17 mos.
Shear, 1941	10 mice	A	M	5 mg. crystals, repeated injections	S.C.	0	---	16 mos.
556.--10-(1,2-BENZANTHRYL)-TRIPHENYL LEAD 								
Dunlap and Warren, 1946	20 mice	C3H	M & F	2.0 mgm. in trycaprylin suspension once	S.C.	0	10 alive at 6 mos.	At least 6 mos.

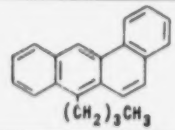
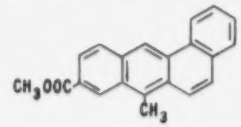
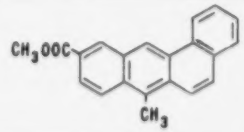
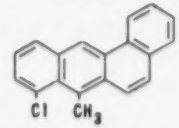
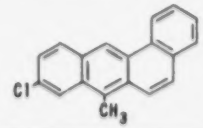
1. Pulmonary adenoma.
2. One mouse with leukemia.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
557.--3,4-BENZFLUORENE 								
Bachmann et al., 1935	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	13 alive at 6 mos., 6 alive at 1 year	537 days
558.--3,4-BENZPHENANTHRENE 								
Cook, 1933a	20 mice	---	---	---	Skin	7 epi., 4 pap.	---	---
Barry et al., 1935	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	5 pap.,[1] 7 epi.[1]	18 alive at 6 mos. 14 alive at 1 year	676 days
Bachmann et al., 1937	20 mice	Stock	---	0.3% in acetone twice weekly	Skin	3 epi.(?) 1 pap.[2]	5 alive at 225 days	225 days
	40 mice	--do--	---	0.3% in benzene twice weekly	--do--	3 pap.[3]	5 alive at 370 days	370 days
Orr, 1938	10 mice	Stock	---	0.3% in benzene weekly	--do--	0	---	18 weeks
Badger et al., 1940	40 mice	Stock	---	0.3% in benzene twice weekly	Skin	4 epi., 1 pap.	---	580 days
	10 mice	--do--	---	5 mg. in sesame oil, repeated injections	S.C.	0	---	445 days
	6 rats	--do--	---	---	S.C.	1 sarc.	---	533 days
Shear and Leiter, 1941b	20 mice	A	M & F	2 mg. crystals	S.C.	0	High mortality due to infection	12 mos.
559.--10-BENZYL-1,2-BENZANTHRACENE 								
Barry et al., 1935	10 mice	Stock	---	0.5 and 1% in benzene twice weekly	Skin	0	8 alive at 6 mos. 3 alive at 1 year	466 days
560.--9,10-BISACETOXYMETHYL-1,2-BENZANTHRACENE 								
Badger and Cook, 1940[4]	Mice	---	---	---	---	Tumors	---	---

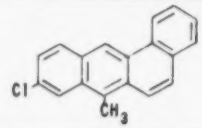
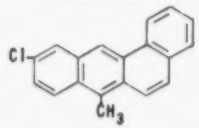
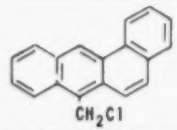
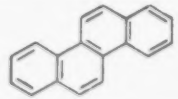
1. First tumor at 260 days and 10 tumors at 410 days.
2. First tumors at 370 days.
3. R is a mixture of even-numbered n-alkyl groups, chiefly lauryl.
4. Citing the unpublished work of E. L. Kennaway.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
560.--9,10-BISACETOXYMETHYL-1,2-BENZANTHRACENE (Continued) 								
Badger et al., 1940	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	1 pap.[1]	---	555 days
	10 mice	--do--	---	5 mg. in sesame oil, repeated injections	S.C.	3 sarc.	---	454 days
Cook et al., 1940a	Mice	---	---	---	Skin	0[2]	---	---
	--do--	---	---	---	S.C.	--do--	---	---
561.--9,10-BISHYDROXYMETHYL-1,2-BENZANTHRACENE 								
Badger and Cook, 1940[3]	Mice	---	---	---	---	Tumors	---	---
Badger et al., 1940	10 mice	Stock	---	5 mg. in sesame oil, repeated injections	S.C.	3 sarc.	---	535 days
Cook et al., 1940a	Mice	---	---	---	S.C.	0[2]	---	---
Badger et al., 1942	10 mice	C3H	---	0.3% in benzene twice weekly	Skin	0	7 alive at 1 year	533 days
562.--5-BROMO-9,10-DIMETHYL-1,2-BENZANTHRACENE 								
Dunlap and Warren, 1946	20 mice	C3H	M & F	2 mgm. in tricaprylin once	S.C.	19[4]	19 alive after 117 days	At least 6 mos.
563.--5-n-BUTYL-1,2-BENZANTHRACENE 								
Badger et al., 1940	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	8 epi., 1 pap.	---	406 days
	10 mice	Stock	---	5 mg. in sesame oil, repeated injections	S.C.	0	---	591 days
Cook et al., 1940a	Mice	---	---	---	Skin	0[2]	---	---
	Mice	---	---	---	S.C.	--do--	---	---
Cook and (Mrs.) A. M. Robinson, 1940	Mice	---	---	Dil. soln. in benzene	Skin	5	---	347 days

1. Papilloma in stomach.
2. No liver lesions.
3. Citing the unpublished work of E. L. Kennaway.
4. One mouse with leukemia.

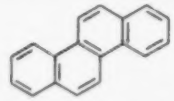
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
564.--10-n-BUTYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940	20 mice	A and C3H	M	5 plus 5 plus 5 plus 5 mg. crystals	S.C.	0	11 alive at 15 mos.	15 mos.
Shear, 1941*	10 mice	A	M	5 mg. crystals, repeated injections	S.C.	0	---	15 mos.
	10 mice	C3H	M	--do--	S.C.	0		15 mos.
565.--6-CARBOMETHOXY-10-METHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940	20 mice	A	M & F	2 mg. crystals	S.C.	0	3 alive at 10 mos.	10 mos.
Shear, 1941	20 mice	A	M & F	2 mg. crystals	S.C.	0	---	9 mos.
566.--7-CARBOMETHOXY-10-METHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940**	10 mice	A	M	2 plus 3 mg. crystals	S.C.	0	4 alive at 9 mos.	12 mos.
567.--5-CHLORO-10-METHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940	20 mice	A	M & F	1 plus 1 mg. in lard[1]	S.C.	16[2]	---	9 mos.
Shear, 1941* **[3]	Mice	---	---	---	S.C.	0	---	4 mos.
568.--6-CHLORO-10-METHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940	20 mice	A	M & F	2 mg. crystals	S.C.	0	8 alive at 9 mos.	11 mos.

1. Substance melts at 133.0°-133.4° C., Corr.
2. First in 4 months.
3. Cited by Newman, 1938b.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
568.--6-CHLORO-10-METHYL-1,2-BENZANTHRACENE (Continued) 								
Shear, 1941	20 mice	A	M & F	2 mg. crystals	S.C.	0	---	11 mos.
569.--7-CHLORO-10-METHYL 1,2-BENZANTHRACENE 								
Shear and Leiter, 1940[a]	10 mice	A	M	5 plus 5 mg. crystals	S.C.	2[1]	8 alive at 9 mos.	10 mos.
	20 mice	A	M & F	2 mg. crystals	S.C.	4[2]	---	18 mos.
Shear 1941[3]	Mice	---	---	---	S.C.	0	---	4 mos.
Shear 1941[4]	--do--	---	---	---	--do--	1	---	7 mos.
570.--10-CHLOROMETHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940[aa]	10 mice	A	M	5 mg. crystals, thrice	S.C.	0[5]	---	16 mos.
571.--CHRYSENE 								
Bloch, 1922	Mice	---	---	---	Skin	0	---	---
Kennaway, 1924a	100 mice	---	---	In "90% benzol"	Skin	0[6]	10 alive at 5 mos. 2 alive at 11 mos.	11 mos.
Kennaway, 1924b	100 mice	---	---	1% in "90% benzol"	--do--	0	5 alive at 6.5 mos.	6.5 mos.
Kennaway, 1924c	Mice	---	---	---	--do--	0	---	---
Twort and Fulton, 1930	Mice	---	---	In liquid paraffin[7]	Skin	1	---	70 weeks
	--do--	---	---	--do--[8]	--do--	0	---	30 weeks
	--do--	---	---	In oleic acid[8]	--do--	2	---	85 weeks

1. First at 7 months.
2. First at 6 months.
3. Cited by Newman and Orchin, 1938.
4. Cited by Newman, 1938b.
5. 2 papillomas. One did not grow further or become invasive by 16 months.
6. Substance quite toxic.
7. Pure substance used.
8. Impure substance used.

571.--CHRYSENE (Continued)

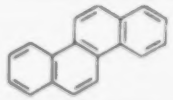
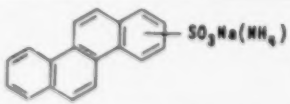
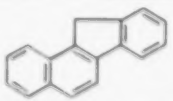


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Cook, 1933a	10 rats	---	---	In fatty medium	S.C.	3 sarc.	---	---
	Mice	---	---	---	Skin	0	---	---
Barry and Cook, 1934	10 rats	---	---	0.2% in lard[1]	S.C.	4[2]	---	626 days
	10 mice	---	---	(1)	S.C.	0	5 alive at 280 days	350 days
Bottomley and Twort, 1934	Mice	---	---	7.5%[3] in liquid paraffin twice weekly	Skin	1[4,5]	---	70 weeks
	--do--	---	---	7.5% in liquid paraffin 5 times weekly	--do--	1[4]	---	78 weeks
	--do--	---	---	7.5% in oleic acid[6] 5 times weekly	--do--	9[4]	---	50 weeks
	--do--	---	---	15% in oleic acid, 5 times weekly	--do--	0	---	60 weeks
	--do--	---	---	0.4% in benzene, 5 times weekly	--do--	0	---	60 weeks
	Mice	---	---	0.4% in benzene plus 0.4% in oleic acid 5 times weekly	Skin	1[7]	---	60 weeks
	--do--	---	---	0.15% in oleic acid 10 times weekly	Skin	0	---	--do--
	--do--	---	---	2% in oleic acid 10 times weekly	--do--	1[7]	---	55 weeks
	--do--	---	M	0.15% in oleic acid	In breast	0	---	60 weeks
	--do--	---	F	---	---	0	---	70 weeks
	50 mice	---	---	0.4% in lard, 0.5 cc.	S.C.	0	---	45 weeks
	--do--	---	---	--do--	I.P.	0	---	50 weeks
Barry et al., 1935	50 mice	Stock	---	0.3%[1] in benzene, twice weekly	Skin	0 epi. 2 pap.	30 alive at 6 mos. 24 alive at 1 year	775 days
	100 mice	--do--	---	7.5%[1] in oleic acid	--do--	0	77 alive at 6 mos. 44 alive at 1 year	797 days
					--do--	0		
	100 mice	--do--	---	0.3% in benzene twice weekly	--do--	1 epi. 1 pap.	74 alive at 6 mos. 30 alive at 1 year	704 days
	20 mice	--do--	---	0.3%[1] in mouse fat	--do--	0	12 alive at 6 mos. 5 alive at 1 year	695 days
	20 mice	Stock	---	0.3%[4a] in benzene twice weekly	--do--	0	11 alive at 6 mos. 5 alive at 440 days	440 days
Boyland and Burrows, 1935	10 rats	---	---	0.05%[8] aq. colloidal soln. twice weekly	S.C.	0	4 alive at 18 mos.	103 weeks
Schürch and Winterstein, 1935	50 mice	---	---	In benzene[9] twice weekly	Skin	0	11 alive at 276 days	---
Bachmann et al., 1937	20 mice	Stock	---	0.3%[4a] in benzene twice weekly	--do--	1 pap.	11 alive at 6 mos. 6 alive at 1 year	853 days

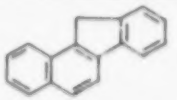
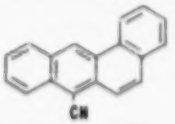
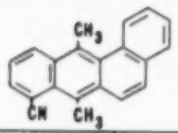
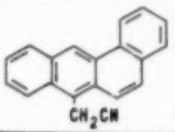
1. Impure sample derived from coal tar; of doubtful purity.
2. Metastases in right axillary glands and lungs.
3. In this paper a purified substance derived from coal tar and melting at 254.5-255° Corr. is used.
4. First tumor arising between 40 and 65 weeks.

4a. Synthetic substance used.

5. In all the experiments described in this paper, many benign tumors were obtained.
6. Oleic acid alone produced occasional benign tumors.
7. First tumor arising between 40 and 65 weeks.
8. Substance quite toxic.
9. Pure substance used. Yellow color of commercial chrysene is due to naphthacene; benzpyrene and 1,2-benzcarbazole are also present (see Schürch, 1934).

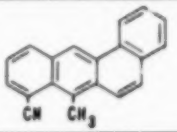
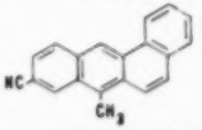
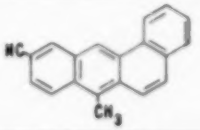
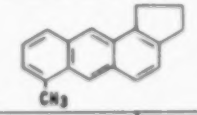
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
571.--CHRYSENE (Continued) 								
Haddow et al., 1937	10 rats	Lister	M & F	30 mg. in sesame oil	i.P.	0	---	38 days
Noble, 1938a	5 rats	Wistar	M	10 mg. crystals	S.C., abdominal wall	0	---	28 days
Orr, 1938[1]	15 mice	Stock	---	0.3% in benzene, weekly	Skin	0	---	18 weeks
	10 mice	---do---	---	Saturated soln. in acetone weekly	---do---	0	---	---do---
Noble, 1939	---do---	---do---	M	---do---	S.C.	0	---	4 weeks
Polila, 1939	41 mice	Inbred albino	---	In water, benzene, or sesame oil	Skin	0	---	133 days
Twort and Twort, 1939	Mice	---	---	In oleic acid[2]	Skin	Tumors[3]	---	85 weeks
	---do---	---	---	In chloroform	---do---	0[4]	---	---
Polila, 1941	5 rats	Wistar	---	5 mg. in sesame oil, weekly	S.C.	0	4 alive at 10 mos.	10 mos.
Shear and Leiter, 1941b	30 mice	A	M & F	10 mg. crystals, twice	S.C.	0	27 alive at 9 mos. 6 alive at 15 mos.	15 mos.
West and Jefferson, 1942	Rats	---	M & F	0.3% in diet	P.O.	0	---	30 days
572.--CHRYSENE-SULFONIC ACID, SODIUM AND AMMONIUM SALTS 								
Twort and Bottomley, 1932	Mice	---	---	In water	Skin	1[5]	---	20 weeks
573.--CHRYSOFLUORENE 								
Barry et al., 1935	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	9 alive at 6 mos.	550 days
Orr, 1938	10 mice	Stock	---	0.3% in benzene weekly	Skin	0	---	18 weeks
Cook et al., 1940a	Mice	---	---	---	Skin	0[6]	---	---

1. See also Orr, 1939 under methylcolanthrene.
2. Impure substance used.
3. Substance regarded as 1/10 as potent as 1,2,5,6-dibenzanthracene in oleic acid.
4. Almost negligible activity.
5. Epithelioma of the forestomach; probably a rare spontaneous tumor.
6. No liver lesions.

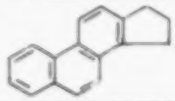
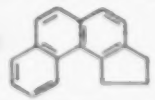
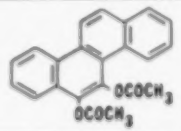
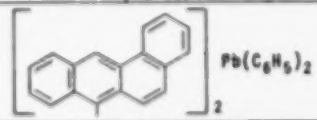
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
573.--CHRYSOFLUORENE (Continued) 								
Badger et al., 1942	20 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	10 alive at 6 mos. 6 alive at 1 year	600 days
	10 mice	---do---	---	5 mg. in sesame oil, repeated injections	S.C.	0	8 alive at 6 mos. 3 alive at 1 year	690 days
574.--10-CYANO-1,2-BENZANTHRACENE 								
Badger et al., 1940	Mice	Stock	---	---	Skin	0	---	387 days
	10 mice	Stock	---	5 mg. in sesame oil, repeated injections	S.C.	4 sarc.	---	533 days
Shear and Leiter, 1940	20 mice	A	M & F	2 plus 5 mg. crystals	S.C.	0	6 alive at 16 mos.	16 mos.
Badger et al., 1942	20 mice	Stock	---	0.5% in benzene twice weekly	Skin	1 epi.[1] 1 pap.	11 alive at 1 year	650 days
575.--5-CYANO-9,10-DIMETHYL-1,2-BENZANTHRACENE 								
Dunlap and Warren, 1946	5 mice	C3H	M & F	2.0 mgm. in tricaprylin	S.C.	2	2 alive at 94 days	At least 6 mos.
576.--10-CYANOMETHYL-1,2-BENZANTHRACENE 								
Cook et al., 1940a	Mice	---	---	---	Skin	0[2]	---	---
	Mice	---	---	---	S.C.	---do---	---	---
Shear and Leiter, 1940*	10 mice	A	M	5 mg. crystals, thrice	S.C.	4	---	19 mos.
Shear, 1941	20 mice	A	M & F	2 mg. crystals, repeated injections	S.C.	0	---	15 mos.

1. Within 397 days; also 1 stomach papilloma.

2. No liver lesions.

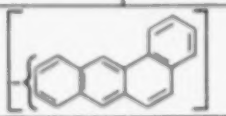
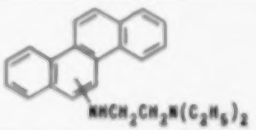
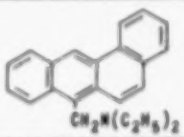
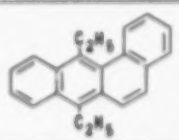
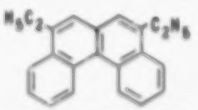
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
577.--5-CYANO-10-METHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940	10 mice	C3H	M	5 mg. crystals	S.C.	10[1]	---	5 mos.
Shear, 1941[2a **]	Mice	---	---	---	S.C.	Tumors[3]	---	4 mos.
578.--6-CYANO-10-METHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940	20 mice	A	M & F	2 mg. crystals	S.C.	0	2 alive at 8 mos.	8 mos.
Shear, 1941	10 mice	A	M & F	2 mg. crystals	S.C.	0	---	8 mos.
579.--7-CYANO-10-METHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940	10 mice	C3H	M	5 mg. crystals, two injections[4]	S.C.	7[5]	---	13 mos.
Shear, 1941[6]	Mice	---	---	---	S.C.	0	---	4 mos.
Shear, unpub. results[7]	10 mice	---	---	---	S.C.	4	---	8 mos.
Shear, 1941[a]	10 mice	C3H	M	5 mg. crystals, repeated injections[4]	S.C.	7	---	1 year
580.--1,2-CYCLOPENTENO-5-METHYLANTHRACENE 								
Shear, 1941[7]	Mice	---	---	---	S.C.	0	---	2 mos.
Shear, 1941[a **]	20 mice	A	M	5 mg. crystals, repeated injections	S.C.	0	---	16 mos.
Shear and Leiter, 1941a	20 mice	A	M	3 plus 7 mg. crystals	S.C.	0	14 alive at 17 mos.	17 mos.

1. First at 3 months.
2. Cited by Newman, 1938b.
3. In 50% of animals in 3 months; in 90% of animals in 4 months.
4. Substance melts at 182.6°-185.0° C. Corr.
5. First at 5 months.
6. Cited by Newman and Orchin, 1938.
7. Unpub. results cited by Fieser and Hershberg, 1937a.

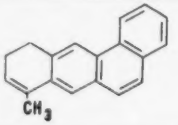
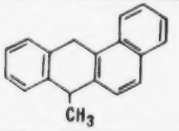
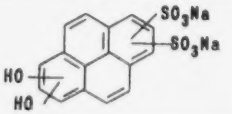
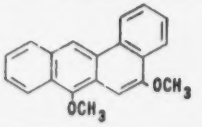
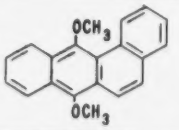
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
581.--1,2-CYCLOPENTENOPHENANTHRENE 								
Barry et al., 1935	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	15 alive at 6 mos. 7 alive at 1 year	439 days
	30 mice	---do---	---	---do---	---do---	0	21 alive at 1 year. 8 alive at 468 days	468 days
	10 rats	---do---		2 mg. in lard weekly	S.C.	0	8 alive at 326 days	326 days
Bachmann et al., 1937	30 mice	Stock	---	0.5%[1] in benzene twice weekly	Skin	0	21 alive at 1 year	724 days
Kinosita, 1937	Rats	---	---	In cholesterol	Liver	0	---	---
	---do---	---	---	---do---	Kidneys	0	---	---
	Rabbits	---	---	---do---	Under periosteum	0	---	---
	---do---	---	---	---do---	Bone marrow	0	---	---
	---do---	---	---	---do---	Brain	0	---	---
	Pigeons	---	---	---do---	---do---	0	---	---
	Toads	---	---	---do---	I.M.	0	---	---
Noble, 1939b	4 rats	Wistar	M	10 mg. crystals	S.C.	0	---	4 weeks
582.--3,4-CYCLOPENTENOPHENANTHRENE 								
Badger et al., 1940	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	---	416 days
583.--5,6-DIACETOXYCHRYSENE[2] 								
Berenblum, unpub. results, 1949	12 mice	Stock	M	2 mg. in 0.2 ml. tricaprylin	S.C.	0	---	48 weeks
584.--10-(DI-1,2-BENZANTHRYL)-DIPHENYLLEAD 								
Dunlap and Warren, 1946	20 mice	C3H	M & F	2.0 mgm. in tricaprylin, one injection	S.C.	0	12 alive at 6 mos.	At least 6 mos.

1. Substance melts at 135°.

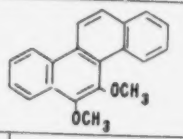
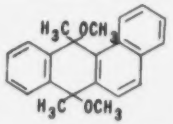
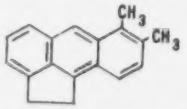
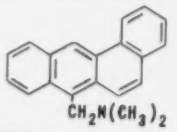
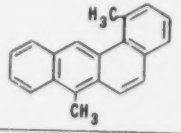
2. Synthesized by J. W. Cook, and R. Schoental (J.C.S., 1945).

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
585.--1,2,1',2',-DIBENZ-6,6'(or 7,7')-DIANTHRYL 								
Cook, 1932b	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	7 alive at 6 mos.	315 days
586.--x-(β-DIETHYLAMINOETHYL)-AMINOCHRYSENE 								
Domagk, 1938	Mice	---	---	1% in water, 41 applications	Skin	0	---	---
587.--10-DIETHYLAMINOMETHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940**	10 mice	A	M	5 mg. crystals, thrice	S.C.	0	All alive at 1 year	17 mos.
588.--9,10-DIETHYL-1,2-BENZANTHRACENE 								
Badger et al., 1940	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	0 epi. 4 pap.[1]	---	424 days
Cook et al., 1940a	Mice	---	---	---	Skin	0	---	---
589.--2,9-DIETHYL-3,4-BENZPHENANTHRENE 								
Shear, 1938a	Mice	---	---	---	---	0	---	4 mos.
Shear and Leiter, 1941b**	10 mice	A	---	2 plus 2 mg. crystals	S.C.	0	7 alive at 9 mos.	11 mos.

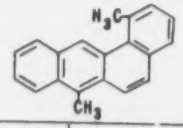
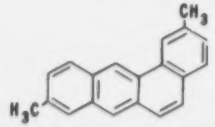
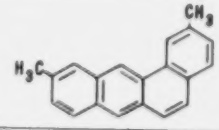
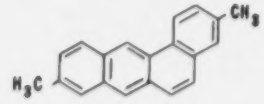
1. No liver lesions.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
590.--7,8--DIHYDRO-5-METHYL-1,2-BENZANTHRACENE 								
Bradbury et al., 1941	10 mice	Inbred	---	5 mg. in sesame oil	S.C.	0	All alive at 7 mos.	7 mos.
591.--9,10-DIHYDRO-10-METHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940**	10 mice	A	M	5 mg. crystals, thrice	S.C.	0	---	14 mos.
592.--9,10-DIHYDRONAPHTHACENE								
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	10 alive at 6 mos. 7 alive at 1 year	466 days
593.--DIHYDROXYPRENE-DISULFONIC ACID, DI-SODIUM SALT 								
Domagk, 1938	Mice	---	---	1% in water, 50 applications	Skin	0	---	10 mos.
594.--3,10-DIMETHOXY-1,2-BENZANTHRACENE 								
Shear, 1941*	10 mice	A	M	5 mg. crystals, repeated injections	S.C.	0	---	13 mos.
595.--9,10-DIMETHOXY-1,2-BENZANTHRACENE[1] 								
Berenblum, unpub. results, 1949	9 mice	Inbred	M	2 mg. in 0.5 ml. arachis oil	S.C.	0	---	15 mos.

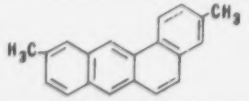
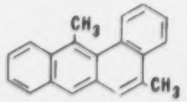
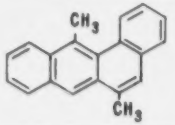
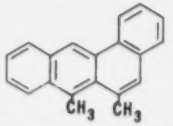
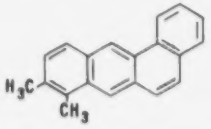
1. Synthesized by R. Schoental.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
596.--5,6-DIMETHOXYCHRYSENE[1] 								
Berenblum, unpub. results, 1949	12 mice	Stock	M	2 mg. in 0.2 ml. tricaprylin	S.C.	0	---	17½ mos.
597.--9,10-DIMETHOXY-9,10-DIMETHYL-9,10-DIHYDRO-1,2-BENZANTHRACENE[2] 								
Shear and Leiter, 1940**	20 mice	C3H	M	5 mg. crystals[3], thrice	S.C.	0	10 alive at 15 mos.	18 mos.
598.--1,2-DIMETHYL-5,10-ACEANTHRENE 								
Shear[4]	Mice	---	---	---	S.C.	0	---	2 mos.
Shear[5]	20 mice	---	---	Crystals	S.C.	0	5 alive at 15 mos.	15 mos.
	Mice	---	---	In lard	S.C.	0	---	7 mos.
Shear, 1941**	20 mice	A	M	3 mg. crystals, repeated injections	S.C.	0	---	16 mos.
Shear and Leiter 1941a	20 mice	A	M	3 plus 5 mg. crystals	S.C.	0	10 alive at 15 mos.	17 mos.
599.--10-DIMETHYLAMINOMETHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940**	10 mice	A	M	5 mg. crystals, thrice	S.C.	0	8 alive at 15 mos.	17 mos.
600.--1',10-DIMETHYL-1,2-BENZANTHRACENE 								
Shear, 1938a	Mice	---	---	---	S.C.	0	---	6 mos.

1. Synthesized by J. W. Cook and R. Schoental (J.C.S., 1945).
2. Reported previously as 9,10-dihydroxy-9,10-dimethyl-9,10-dihydro-1,2-benzanthracene. Identity indicated in private communication of M. S. Newman to M. J. Shear, 1939.
3. Melts at 175.4-176.0° C. Corr.
4. Unpub. results cited by Fieser and Hershberg, 1937a.
5. Cited by Fieser and Campbell, 1938.

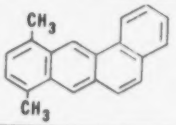
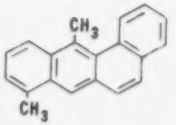
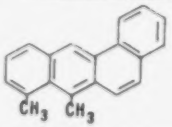
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
600.--1',10-DIMETHYL-1,2-BENZANTHRACENE (Continued) 								
Shear and Leiter, 1940	20 mice	A	M & F	5 plus 2 mg. crystals	S.C.	0	14 alive at 1 year	20 mos.
	--do--	A	--do--	0.5 mg. in lard plus 5 mg. crystals	S.C.	0	--do--	17 mos.
Seligman and Shear, 1941[**1]	Mice	---	---	Crystals	S.C.	0	20 alive at 2 mos.	2 mos.
601.--2',6-DIMETHYL-1,2-BENZANTHRACENE 								
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	7 alive at 6 mos. 6 alive at 1 year	674 days
Badger et al., 1942	17 mice	C3H	---	0.3% in benzene twice weekly	S.C.	0	4 alive at 6 mos.	380 days
	4 mice	--do--	---	5 mg. in glycerol, repeated injections	S.C.	0	4 alive at 6 mos.	147 days
602.--2',7-DIMETHYL-1,2-BENZANTHRACENE 								
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	8 alive at 6 mos., 6 alive at 1 year	786 days
603.--3',6-DIMETHYL-1,2-BENZANTHRACENE 								
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	9 alive at 6 mos., 6 alive at 1 year	707 days

1. Cited by Fieser and Seligman, 1938.

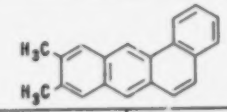
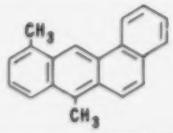
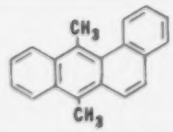
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
604.--3',7-DIMETHYL-1,2-BENZANTHRACENE 								
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	9 alive at 6 mos., 8 alive at 1 year	612 days
605.--3,9-DIMETHYL-1,2-BENZANTHRACENE 								
Shear, 1941	20 mice	A	M & F	2 mg. crystals	S.C.	0	---	Over 1 year
Shear and Leiter, 1941b	20 mice	A	M & F	2 mg. crystals	S.C.	0	10 alive at 13 mos.	13 mos.
606.--4,9-DIMETHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1941b**	20 mice	A	M & F	2 mg. crystals	S.C.	9	5 neg. alive at 7 mos.	12 mos.
607.--4,10-DIMETHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940**	20 mice	A	M & F	1 mg. in lard	S.C.	7[1]	---	14 mos.
608.--5,6-DIMETHYL-1,2-BENZANTHRACENE 								
Barry et al., 1935	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	16 epi.[2] 0 pap.	18 alive at 6 mos., 3 alive at 331 days	331 days

1. First at 5 months.

2. First in 145 days; 10 tumors in 220 days.

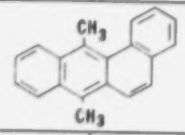
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
609.--5,8-DIMETHYL-1,2-BENZANTHRACENE 								
Dunlap and Warren, 1946	15 mice	C3H	M & F	1.0 mgm. in tricaprylin	S.C.	0	14 alive at 6 mos.	At least 6 mos.
	10 mice	Swiss	--do--	--do--	--do--	0[1]	10 alive at 6 mos.	At least 6 mos.
	5 mice	C3H	--do--	2.0 mgm. in tricaprylin	--do--	0	4 alive at 6 mos.	--do--
	10 mice	--do--	--do--	2.0 mgm. in glycerine	--do--	0	9 alive at 6 mos.	--do--
	5 mice	Swiss	--do--	2.0 mgm. in tricaprylin	--do--	0	5 alive at 6 mos.	--do--
	10 mice	--do--	--do--	2.0 mgm. in glycerine	--do--	0[2]	10 alive at 6 mos.	--do--
610.--5,9-DIMETHYL-1,2-BENZANTHRACENE 								
Shear, 1937b	Mice	Inbred	---	---	S.C.	Tumors[3]	---	---
Shear, 1938a	20 mice	A	M	1 mg. in lard	S.C.	18	0 neg. alive 4 mos.	4 mos.
Shear, 1938c	20 mice	Inbred	---	---	---	18 sarc.	---	4 mos.
Shear, 1941[4]	20 mice	---	---	---	---	19	---	3½ mos.
611.--5,10-DIMETHYL-1,2-BENZANTHRACENE 								
Shear, 1941[5]	19 mice	---	---	10 mg. crystals	S.C.	7	---	3½ mos.
Shear, 1938a	16 mice	A	M	--do--	S.C.	9	1 neg. alive at 4 mos.	4 mos.
	20 mice	A	M	1 mg. in lard	S.C.	12	0 neg. alive at 4 mos.	--do--

1. 2 mice with pulmonary adenoma at 481 days and 530 days.
2. One mouse with pulmonary adenoma.
3. First in 1 month.
4. Cited by Newman 1937.
5. Cited by Fieser and Newman, 1936.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
612.--6,7-DIMETHYL-1,2-BENZANTHRACENE 								
Cook, 1933a	Mice	---	---	---	Skin	Epi.	---	---
Cook, 1933b	10 mice	---	---	1	Skin	3 epi., 1 pap.	---	15 mos.
	20 mice	---	---	2	Skin	Pap.	5 alive at 1 year	14 mos.
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly[1]	Skin	3 epi., 1 pap.	10 alive at 6 mos., 5 alive at 1 year	588 days
	20 mice	--do--	---	--do--[2]	--do--	2 pap.	16 alive at 6 mos., 5 alive at 1 year	486 days
613.--8,10-DIMETHYL-1,2-BENZANTHRACENE 								
Dunlap and Warren, 1946	5 mice	C3H	M & F	1.0 mgm. in tricaprylin	S.C.	5[3]	5 alive at 140 days	At least 6 mos.
	--do--	Swiss	--do--	--do--	S.C.	1[4]	3 alive at 147 days	--do--
	--do--	--do--	--do--	2.0 mgm. in tricaprylin	S.C.	0[4]	1 alive at 6 mos.	--do--
	10 mice	C3H	--do--	--do--	S.C.	4[5]	9 alive at 113 days, 3 alive at 6 mos.	--do--
614.--9,10-DIMETHYL-1,2-BENZANTHRACENE 								
Bachmann et al., 1938	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	8 epi.[6] 5 pap.	15 alive at 85 days	172 days
	40 mice	--do--	---	1 to 10 mg. in sesame oil	S.C.	Several	High mortality	At least 126 days
Shear, 1938a	20 mice	A	M & F	1 mg. in lard	S.C.	2	6 neg. alive at 4 mos.	4 mos.
	--do--	A	--do--	0.1 mg. in lard	S.C.	6	13 neg. alive at 4 mos.	4 mos.

1. Crude sample melting at 166°-168°C.
2. Pure sample melting at 173°-174°C.
3. Average induction time 175 days.
4. One mouse with pulmonary adenoma.
5. Average induction time 133 days.
6. First at 83 days.

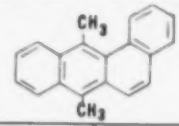
614.--9,10-DIMETHYL-1,2-BENZANTHRACENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Cook, 1939	20 mice	---	---	0.5% in benzene	Skin	14[1]	15 alive at 76 days	---
Badger et al., 1940	20 mice	Stock	---	0.5% in benzene twice weekly	Skin	8 epi., 5 pap.	---	172 days
	40 mice	---do---	---	5 mg. in sesame oil, repeated injections	S.C.	3 sarc.[2]	---	165 days
Cook et al., 1940a	Mice	---	---	---	Skin	0[3]	---	---
	---do---	---	---	---	S.C.	---do---	---	---
Lee and Lewisohn, 1940	10 mice	dba	---	0.5% in benzene twice weekly	Skin	0[4]	---	65-133 days
	30 mice	C57, brown	---	---do---	---do---	---do---	---	145 days
	10 mice	A	---	---do---	---do---	---do---	---	---do---
Sall and Shear, 1940	20 mice	A	M & F	0.05 mg. in lard	S.C.	7	7 lost in epidemic	7 mos.
Shear and Leiter, 1940*	20 mice	A	M & F	1 mg. in lard	S.C.	4	8 alive at 4 mos.	11 mos.
	20 mice	A	M & F	0.1 plus 0.25 mg. in lard	S.C.	15	18 alive at 3 mos.	8 mos.
Bradbury et al., 1941	14 mice	Inbred	---	0.5% in acetone twice weekly[5]	Skin	4 epi.	3 alive neg. at 5 mos.	5 mos.
	30 mice	---do---	---	---do---[6]	---do---	8 epi.	8 alive neg. at 7 mos.	7 mos.
	15 mice	---do---	---	0.5% in benzene twice weekly	---do---	3 epi.	8 alive neg. at 1 year	1 year
	9 mice	---do---		5 mg. in sesame oil	S.C.	2	6 died in 3 weeks	4 mos.
	---do---	---do---	---	5 mg. in propylene glycol	S.C.	1 sarc., 1 carc.	4 alive at 3 mos.	3 mos.
Davenport et al., 1941	10 rats	Stock	M & F	8 mg. in rat fat	S.C.	3	3 died early	At least 264 days
	6 rats	---do---	---do---	8 mg. in linseed oil	---do---	5	1 died early	At least 152 days
	10 rats	---do---	---do---	8 mg. in lard	---do---	7	---	At least 310 days
	6 rats	---do---	---do---	8 mg. in lanolin	---do---	6	---	At least 164 days
Engelbreth-Holm and LeFevre, 1941a	34 mice	AKa	M & F	1 mg.	S.C. or on skin	0	23 alive at 8 mos.	8 mos.
	94 mice	---	M & F	---do---	---do---	Tumors[7]	---	---do---
	14 mice	AKa	---do---	0.5%	Skin	0	11 alive at 8 mos.	---do---
	20 mice	---do---	---do---	1 mg.	S.C.	0	12 alive at 8 mos.	---do---

1. First at 55 days.
2. One other had an epithelioma at site, but no sarcoma.
3. No liver lesions.
4. General lymphomatosis in majority of animals.
5. Protected from light.
6. Not protected from light.
7. 10 with breast cancer.

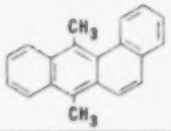
614.--9,10-DIMETHYL-1,2-BENZANTHRACENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Engelbreth-Holm and LaFevre, 1941a	44 mice	DIb	M & F	1/2-1 mg.	S.C.	Tumors[1]	36 alive at 9 mos.	9 mos.
Engelbreth-Holm and LaFevre, 1941b	44 mice	Little's DIb	M & F	0.5-1 mg. in olive oil	S.C.	7[2]	25 died early	36 weeks
	50 mice	—do—	—do—	0.5% in benzene, twice or three times weekly	Skin	24[3]	17 died early	38 weeks
	20 mice	Furth's AKa	—do—	1 mg. in olive oil	S.C.	7[4]	8 died early	29 weeks
	14 mice	—do—		0.5% in benzene three times weekly	Skin	7[5]	3 died early	20 weeks
	38 mice	AKa	—	0.5% in benzene twice weekly	Skin	0[6]	—	—
Fedotov, 1941	Axolotl	—	—	In coagulated egg albumin	S.C.	0[7]	—	14 mos.
Lee, 1941a	119 mice	Dba	M & F	0.5% in benzene twice weekly	Skin	Several[8]	—	Over 165 days
	15 mice	—do—	—	0.1% in benzene, twice weekly	—do—	0[9]	—	—
	30 mice	—do—	—	0.1 mg. in olive oil	S.C.	0[10]		
	45 mice[11]	—do—	M & F	0.5% in benzene twice weekly	Skin	0[12]	—	Over 155 days
	44 mice	C	—do—	—do—	—do—	Epi.[13]	—	Over 175 days
	20 mice	Leaden	—	—do—	—do—	15	—	150 days
	22 mice	C3H	—	—do—	—do—	21	—	120 days
	15 mice	Swiss	—	—do—	—do—	4[14]	—	150 days
	—do—	ABC	—	—do—	—do—	10	—	—do—
	12 mice	N	—	—do—	—do—	7	—	—do—
	30 mice	C57 black	—	—do—	—do—	15	—	120 days
	—do—	C57 brown	—	—do—	—do—	21	—	100 days
Lee, 1941b	30 mice	C57 brown	—	0.5% in benzene twice weekly	Skin	Pap. & carc.[15]	—	12 weeks
	10 mice	C57 brown	—	0.5% in benzene once	Skin	2 pap.[16] 8 carc.[17]	—	At least 421 days
Shear, 1941[18]	Mice	—	—	1 mg. in lard	S.C.	0	—	5 mos.
	—do—	—	—	0.1 mg. in lard	S.C.	0	—	2 mos.
Rusch et al., 1942	40 mice	ABC	M & F	0.01% in benzene thrice weekly[19]	Skin	Epi. & 15 carc.	—	28 weeks
	24 mice	—do—	—do—	0.1% in benzene thrice weekly for 12 weeks	Skin	5 carc., 10 pap.	—	32 weeks
Stamer, 1943a	26 mice[20]	Street	—	0.5 mg. susp. in water or in olive oil soln.	S.C.	13[21]	—	Over 147 days

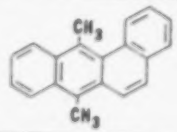
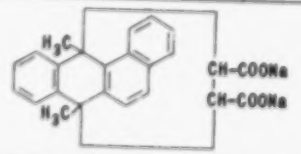
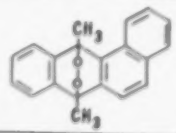
1. 3 mammary cancer at 9 months.
2. Also 5 with leukemia or lymphosarcoma before 8 months and 3 with mammary carcinoma before 9 months.
3. Also 7 with leukemia or lymphosarcoma before 8 months and 7 with mammary carcinoma before 9 months.
4. Also 9 with leukemia or lymphosarcoma before 8 months.
5. Also 10 with leukemia or lymphosarcoma before 8 months.
6. 2 with leukemia.
7. Atypical epithelial cell proliferation.
8. Also leukemia (of 3 types) in 111 animals.
9. General lymphomatosis in 5.
10. 3 with lymphoid reactions.
11. Older animals.
12. 7 animals with general lymphomatosis.
13. Several at about 4 months; also 33 with myeloid leukemia.
14. 12 with general lymphomatosis.
15. Also majority developed a leukemoid condition involving only liver and spleen.
16. First at 169 days.
17. First at 224 days.
18. Cited by Newman, 1938a.
19. One animal also irradiated with U.V., and painted with other hydrocarbons.
20. Effective total.
21. Fibrosarcoma and also 2 leukemia.

614.--9,10-DIMETHYL-1,2-BENZANTHRACENE (Continued)

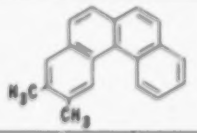
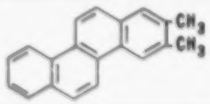
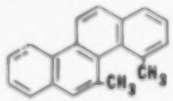
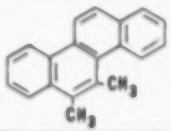


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Stamer and Engelbreth-Holm, 1943a	12 mice	Street	---	0.5 mg. in aq. susp.	S.C.	6 sarc.[1]	---	Over 125 days
	14 mice	--do--	---	0.5 mg. in olive oil	S.C.	7 sarc.[1]	---	147 days
Stamer, 1943b	12 mice	Street	---	0.5 mg. in aq. susp.	S.C.	6 sarc.[1]	---	Over 125 days
	14 mice	--do--	---	0.5 mg. in olive oil	--do--	7 sarc.[1]	---	147 days
Engelbreth-Holm and Poulsen, 1944	68 mice	Street	M & F	0.1 mg. once per week then 2-3 times a week	P.O.[2]	Mamm. carc.	---	At least 9 mos.
Stamer, 1944	39 mice	Dib	F	2 mg. in water weekly, for 4 weeks	Inj.	Tumors	14 alive at 10 mos.	16 mos.
	116 mice	Aka	M & F	--do--	--do--	0	47 alive at 4 mos.	--do--
	115 mice	Black	--do--	--do--	--do--	2[3]	28 alive at 5 mos.	16 mos.
	108 mice	Street	F	--do--	--do--	Tumors[4]	51 alive at 4 mos.	26 mos.
Beck,S., 1945	11 rabbits	---	---	0.3% in acetone for 16 weeks plus 2% for 16 weeks	Skin, ear	5 pap.	---	37 weeks
Berenblum, 1945	10 rabbits	White	---	0.5% weekly	Skin	Pap.[5]	---	At least 8 weeks
	5 rabbits	--do--	---	1% in benzene, 6 drops twice weekly	--do--	5[7]	---	26 weeks
Burrows et al., 1945	26 mice	MRC	M	0.1% in acetone, twice weekly for 70 days	Skin	12 pap., 9 carc.	---	150 days
Stamer, 1945	13 mice	Aka	---	2 mg.-4 mg. suspended in postonal	I.V.	0	---	Ca 60 days
	24 mice	Street	---	2 mg.-16 mg. suspended in postonal	I.V.	0	---	Ca 38 days
Dunlap and Warren, 1946	20 mice	Swiss	M & F	2.0 mg. in tricaprylin	S.C.	10[6]	16 alive at 67 days	At least 6 mos.
Dickens and Weil-Malherbe, 1946	10 mice	---	---	0.15% soln. in benzene twice weekly	Skin	9 pap.	---	4 mos.
	9 mice	---	---	0.5 mgm. 0.3 ml. sesame oil, single dose	S.C.	0	---	--do--
Rudali et al., 1946	10 mice	XVII	---	0.3% in acetone twice weekly	Skin	0	---	At least 96 days
	--do--	--do--	---	0.3% plus 3,4,5,6-dibenzophenothiazin	--do--	0	---	--do--
	--do--	--do--	---	0.3% plus 1,2 benzanthracene	--do--	0	---	--do--

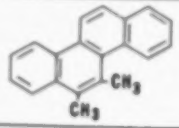
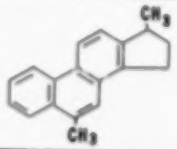
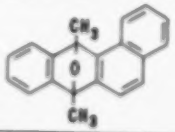
1. And one leukemia.
2. By stomach tube.
3. Ovarian.
4. Mammary cancer and lung cancer.
5. First papilloma in 5 weeks. 8th week tumors in 6 of 10 rabbits - some single, some multiple.
6. 2 with epidermoid carcinoma. 6 with leukemia and 3 with adenoma of the lung.
7. 4 malignant.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
614.--9,10-DIMETHYL-1,2-BENZANTHRACENE (Continued) 								
Hubati et al., 1946 (Continued)	10 mice	Kill	---	0.05% in acetone twice weekly	Skin	Tumors[1]	---	At least 255 days
	--do--	--do--	---	0.05% in acetone plus 5,4,5,6-dibenzo-phenothiazin	--do--	--do--[2]	---	At least 120 days
	--do--	--do--	--do--	0.05% in acetone plus 1,2-benzanthracene	--do--	--do--[3]	---	At least 496 days
Engelbreth-Holm and Hask-Nielsen, 1947	50-110 mice	Street	M & F	0.02 mgm. in paraffin	S.C.	Tumors[4]	At least 25 alive after 15 mos.	At least 15 mos.
Herertium, unpub. results, 1949[5]	20 rats	Stock	F	0.5% in benzene, weekly	Skin	17[6]	---	---
	10 guinea pigs	---	M	0.5% in benzene, weekly	Skin	4[7]	---	---
	20 rats	Stock	F	1 mg. in 0.5 ml. tricaprylin	S.C.	15[8]	---	---
	20 guinea pigs	---	M	5 mg. in 0.5 ml. tricaprylin	S.C.	7[9]	---	---
615.--9,10-DIMETHYL-1,2-BENZANTHRACENE-ENDO-α,β-SUCCINIC ACID, SODIUM SALT 								
Parsons and Aarron, 1940[10]	Mice	---	---	---	Inj.	0	---	---
616.--9,10-DIMETHYL-1,2-BENZANTHRACENE-9,10-PEROXIDE[11] 								
Badger et al., 1940	10 mice	Stock	---	5 mg. in benzene, repeated injections	S.C.	0	---	346 days
Cook and Martin, 1940	Mice	---	---	Suspension in sesame oil	---	0	---	---

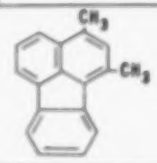
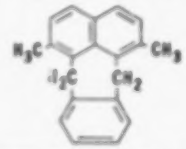
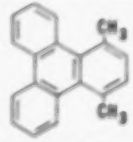
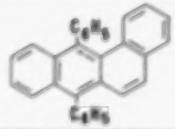
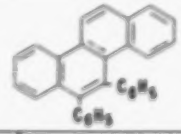
1. All had cancer and papillomas.
2. 6 animals had cancer.
3. 4 papilloma; 3 had cancer.
4. Mainly thymic tumors (lymphosarcomatous).
5. Preliminary reports of these results; 25rd Ann. Rep., Brit. Emp. Cancer Camp. 1946 105-106.
6. Appearing from 17th to 40th week but average latent period 32 weeks. 11/14 became malignant.
7. All became malignant (1 malignant melanoma) Appeared in 30, 42, 51 and 64 weeks.
8. 1 squamous carcinoma; 12 sarcomas; 2 sarcomas with adenocarcinoma (mammary).
9. 5½ months to 11 months.
10. Cited by Cook and Kennaway, 1940.
11. Formed by atmospheric oxidation in presence of light.

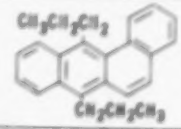
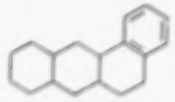
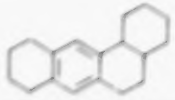
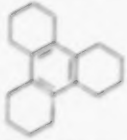
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
617.--2,9-DIMETHYL-3,4-BENZPHENANTHRENE								
Shear, 1938a	Mice	---	---	---	---	0	---	5 mos.
Shear and Leiter, 1941b**	20 mice	A	M & F	1 mg. in lard, 5 injections	S.C.	0	14 alive at 12 mos. 5 alive at 18 mos.	20 mos.
618.--6,7-DIMETHYL-3,4-BENZPHENANTHRENE 								
Shear[1]	Mice	---	---	---	S.C.	0	---	16 mos.
Shear, 1938a	10 mice	A	M	7 mg. crystals, repeated injections	S.C.	0	5 neg. alive at 15 mos.	17 mos.
619.--2,3-DIMETHYLCHRYSENE 								
Shear, 1938a	10 mice	A	M	10 mg. crystals, repeated injections	S.C.	0[2]	3 alive at 12 mos.	12 mos.
620.--4,5-DIMETHYLCHRYSENE 								
Dunlap and Warren, 1943	55 mice	Swiss	M	1 or 2 mg. in tricaprylin	S.C.	1 sarc.	---	At least 571 days
	10 mice	C3H	M	2 mg. in tricaprylin	S.C.	0	---	Over 6 mos.
621.--5,6-DIMETHYLCHRYSENE 								
Badger et al., 1940	20 mice	---	---	0.5% in benzene, twice weekly	Skin	6 epi., 1 pap.	---	389 days
	10 mice	---	---	5 mg. in sesame oil, repeated injections	S.C.	0[3]	---	469 days

1. Unpublished results cited by Newman and Joshel, 1938.
2. One spindle-cell tumor adherent to right salivary gland.
3. Lung epitheliona at 335 days.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
621.--5,6-DIMETHYLCHRYSENE (Continued) 								
Cook et al., 1940a	Mice	---	---	---[1]	Skin	0^2	---	---
	Mice	---	---	---	S.C.	--do--	---	---
	Mice	---	---	---	P.O.	--do--	---	---
Cook and Kennaway, 1940	Mice	---	---	---	Skin	Epi.	---	---
Hewett, 1940	20 mice	---	---	---	Skin	4 epi.	---	389 days
Badger et al., 1942	10 mice	Stock	---	In food[1]	P.O.	0	8 alive at 6 mos. 1 alive at 1 year	399 days
Dunlap and Warren, 1943	15 mice	Swiss	M	2 mg. in tricaprylin	S.C.	0	---	Over 6 mos.
	10 mice	C3H	M	--do--	S.C.	2 sarc.	---	At least 171 days
622.--3,9-DIMETHYL-CYCLOPENTENOPHENANTHRENE 								
Butenandt and Suranyi, 1942	10 mice	BIH	M & F	1% in benzene, 1 drop twice weekly	Skin	0	9 alive at 7 mos., 4 alive at 8 mos.	Over 8 mos.
	5 mice	--do--	F	5 mg. in sesame oil	S.C.	0	All alive at 11 mos.	Over 11 mos.
623.--9,10-DIMETHYL-9,10-DIHYDRO-1,2-BENZANTHRACENE-9,10-OXIDE 								
Badger et al., 1940	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	5 epi., 5 pap.	---	353 days
Cook et al., 1940a	Mice	---	---	---	Skin	0^2	---	---
624.--DIMETHYL DINAPHTHYL PYRENE[3]								
Domagk, 1950	Mice	---	---	1% in water, 41 applications	Skin	0	---	---

1. Called 1,2-dimethylchrysene.
2. No liver lesions.
3. Specific isomer not stated.

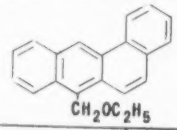
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
625.--2,4-DIMETHYLFLUORANTHENE 								
Badger et al., 1942	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	9 alive at 6 mos., 2 alive at 1 year	527 days
626.--1,6-DIMETHYLPLEIADENE 								
Shear, 1936a	10 mice	A	M	10 mg. crystals, repeated injections	S.C.	0	5 alive at 18 mos.	18 mos.
627.--1,4-DIMETHYLTRIPHENYLENE 								
Shear and Leiter, 1941b	20 mice	A	M & F	5 mg. crystals	S.C.	0	12 alive at 15 mos.	15 mos.
Shear, 1941	20 mice	A	M & F	5 mg. crystals	S.C.	0	---	Over 10 mos.
628.--9,10-DIPHENYL-1,2-BENZANTHRACENE 								
Barry et al., 1955	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	11 alive at 6 mos., 7 alive at 1 year	692 days
629.--5,6-DIPHENYLCHRYSENE 								
Barry et al., 1955	9 mice	Stock	---	0.5% in benzene twice weekly	Skin	1 pap.	4 alive at 6 mos., 1 alive at 1 year	525 days

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
630.--9,10-DI-n-PROPYL-1,2-BENZANTHRACENE 								
Bradbury et al., 1961	10 mice	inbred	---	5 mg. in propylene glycol	S.C.	0	All alive at 109 mos.	109 mos.
631.--DODECAHYDRO-1,2-BENZANTHRACENE[1] 								
Barry et al., 1935	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	1 sarc.	9 alive at 6 mos., 7 alive at 1 year	351 days
Bachmann et al., 1937	10 mice	--do--	---	--do--	--do--	0	--do--	671 days
632.--DODECAHYDRO-1,2-BENZANTHRACENE[2] 								
Bachmann et al., 1937	20 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	16 alive at 6 mos., 2 alive at 1 year	654 days
633.--DODECAHYDRO-1,2-BENZANTHRACENE[3]								
Haddow et al., 1937	9 rats	Lister	M & F	30 mg. in sesame oil	I.P.	0	---	29 days
634.--DODECAHYDROTRIPHENYLENE 								
Kennaway, 1930	Mice	---	---	In benzene	Skin	0	---	---
Kennaway and Hieger, 1930	--do--	---	---	---	Skin	0	---	---
Twort and Fulton, 1950	--do--	---	---	Suspension in liquid paraffin	Skin	0	---	50 weeks

1. Melting point 71°-72°.
2. Melting point 87°-88°.
3. Specific isomer not stated.

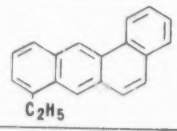
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

635.--10-ETHOXYMETHYL-1,2-BENZANTHRACENE



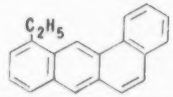
Badger and Cook, 1940[1]	Mice	---	---	---	---	0	---	---
Badger et al., 1940	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	2 epi., 4 pap.	---	481 days
	10 mice	--do--	---	5 mg. in sesame oil, repeated injections	S.C.	0	---	292 days
Cook et al., 1940a	Mice	---	---	---	Skin	0[2]	---	---
	Mice	---	---	---	S.C.	--do--	---	---

636.--5-ETHYL-1,2-BENZANTHRACENE



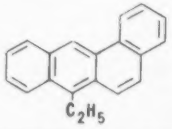
Bachmann et al., 1937	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	5 epi., 2 pap.	9 alive at 6 mos., 3 alive at 1 year	455 days
Cook et al., 1937	Mice	--do--	---	---	Skin (?)	Tumors	---	---

637.--8-ETHYL-1,2-BENZANTHRACENE



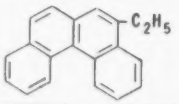
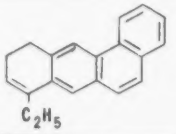
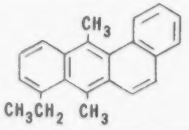
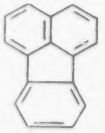
Dunlap and Warren, 1940	10 mice	C3H	M & F	2.0 mg. in tricaprylin	S.C.	0	9 alive at 6 mos.	At least 6 mos.
	5 mice	Swiss	--do--	--do--	--do--	0	1 alive at 6 mos.	--do--
	--do--	C3H	--do--	1.0 mg. in glycerine	--do--	0	4 alive at 6 mos.	--do--
	10 mice	--do--	--do--	--do--	--do--	0[3]	5 alive at 6 mos.	At least 594 days

638.--10-ETHYL-1,2-BENZANTHRACENE

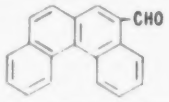
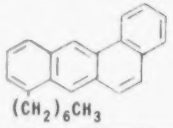
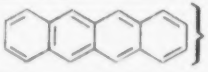
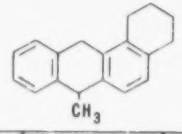
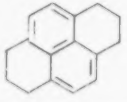


Shear, unpub. results[4]	20 mice	---	---	Crystals	S.C.	13	---	9 mos.
Shear, 1938c	Mice	Inbred	---	---	---	Sarc.	---	---
Shear and Leiter, 1940[5]	20 mice	A	M	5 mg. plus 10 mg. crystals	S.C.	16	---	12 mos.

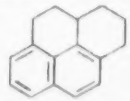
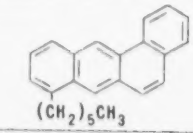
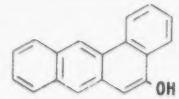
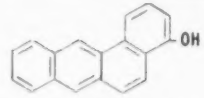
1. Citing unpublished work of E. L. Kennaway.
2. No liver lesions.
3. 3 pulmonary adenomas at 430, 569, and 594 days.
4. Cited by Fieser and Hershberg, 1937b.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
639.--2-ETHYL-3,4-BENZPHENANTHRENE 								
Badger et al., 1940	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	2 epi. 3 pap.	9 alive at 6 mos.	272 days
Badger et al., 1942	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	2 epi.[1]	9 alive at 6 mos.	272 days
640.--5-ETHYL-7,8-DIHYDRO-1,2-BENZANTHRACENE 								
Badger et al., 1940	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	---	644 days
641.--5-ETHYL-9,10-DIMETHYL-1,2-BENZANTHRACENE 								
Bradbury et al., 1941	10 mice	Inbred	---	2 mg. in sesame oil	S.C.	0	All alive at 6 mos.	6 mos.
	10 mice	Inbred	---	0.3% in benzene twice weekly	Skin	0	All dead by 6 mos.	6 mos.
642.--FLUORANTHENE 								
Bloch, 1922	Mice	---	---	---	Skin	0	---	---
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	3 alive at 6 mos., 3 alive at 1 year	501 days
	--do--	--do--	---	--do--	--do--	0	4 alive at 6 mos., 1 alive at 1 year	379 days
Haddow et al., 1937	9 rats	Lister	M & F	30 mg. in sesame oil	I.P.	0	---	29 days
Shear, 1938	14 mice	A	M & F	10 mg. crystals, repeated injections	S.C.	0	6 alive at 18 mos.	18 mos.

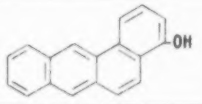
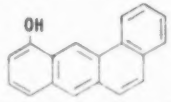
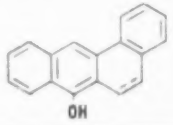
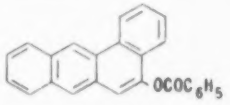
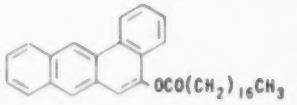
1. First within 214 days. Also one extensive S.C., spindle-cell tumor of painted area.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
643.--2-FORMYL-3,4-BENZPHENANTHRENE 								
Badger et al., 1942	10 mice 10 mice	C3H --do--	--- ---	0.5% in benzene twice weekl, 5 mg. in glycerol, repeated injections	Skin S.C.	0 1 sarc.	6 alive at 6 mos. 7 alive at 6 mos., 3 alive at 1 year	305 days 398 days
644.--5-n-HEPTYL-1,2-BENZANTHRACENE 								
Badger et al., 1940 Cook et al., 1940a Cook and Robinson, (Mrs. A.M.), 1940 Badger et al., 1942	20 mice 10 mice Mice Mice Mice 20 mice	Stock Stock --- --- --- Stock	--- --- --- --- --- ---	0.5% in benzene twice weekly 5 mg. in sesame oil, repeated injections --- --- Dil. soln. in benzene 0.5% in benzene twice weekly	Skin S.C. Skin S.C. Skin Skin	1 epi. 0 0[1] --do-- 0 1 epi.	--- --- --- --- --- 18 alive at 6 mos., 9 alive at 1 year	574 days 542 days --- --- 294 days 706 days
645.--HEXABROMONAPHTHACENE 								
Velluz, 1938	Mice	---	---	In benzene	Skin	0	---	10 mos.
646.--1',2',3',4',9,10-HEXAHYDRO-10-METHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940**	20 mice	A	M & F	5 mg. in lard, 4 times	S.C.	0	3 alive at 15 mos.	16 mos.
647.--sym-HEXAHDROPYRENE 								
Barry et al., 1935	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	9 alive at 6 mos.	664 days

1. No liver lesions.

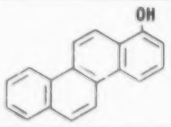
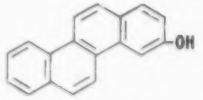
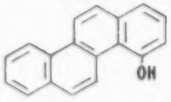
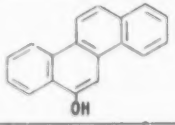
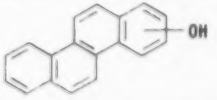
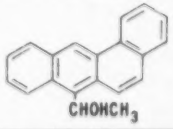
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
648.--unsym-HEXAHYDROPYRENE 								
Harry et al., 1946	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	8 alive at 6 mos., 1 alive at 1 year	461 days
649.--5-n-HEXYL-1,2-BENZANTHRACENE 								
Badger et al., 1940	20 mice	Stock	---	0.4% in benzene twice weekly	Skin	2 epi.,[1] 4 par.	---	471 days
Cook and Robinson (Mrs. A.M.), 1940	Mice	---	---	Oil. soln. in benzene	Skin	0	---	262 days
Cook et al., 1940a	Mice	---	---	---	Skin	0[1]	---	---
	Mice	---	---	---	S.C.	--do--	---	---
Badger et al., 1942	10 mice	Stock	---	5 mg. in sesame oil, repeated injections	S.C.	0	9 alive at 6 mos., 5 alive at 1 year	406 days
650.--3-HYDROXY-1,2-BENZANTHRACENE 								
Shear and Leiter, 1941[2]	11 mice	A	F	ca. 10 mg. crystals	S.C.	0	8 alive at 1 year	21 mos.
	10 mice	dba	M	10 plus 10 plus 5 plus 5 mg. crystals	--do--	2	---	15 mos.
Shear, 1941[3]	10 mice	---	---	Crystals	S.C.	2	---	8 mos.
Shear, 1941[3]	11 mice	---	---	---	--do--	0	---	---
	10 mice	---	M	---	--do--	2	---	8 mos.
651.--4'HYDROXY-1,2-BENZANTHRACENE 								
Cahal et al., 1940	9 rats	---	---	6 mg. in lard, once	S.C.	0	---	10-14 mos.
	10 rats	---	---	12 mg. in lard	S.C.	0	---	10-12 mos.
Dickens, F. and Weil-Malherbe, 1946	10 mice	---	---	0.15% in benzene twice weekly	Skin	Tumors[4]	---	10 mos.
	--do--	---	---	0.5 mgm. in 0.2 ml. sesame oil, single dose	Skin	0	---	--do--

1. No liver lesions.
2. Cited by Fieser et al., 1948a.
3. Cited by Fieser et al., 1937b.
4. Distant; one adenocarcinoma.

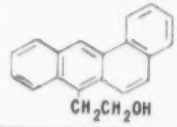
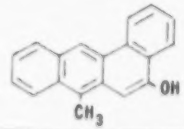
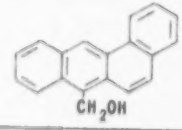
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
651.--4'HYDROXY-1,2-BENZANTHRACENE (Continued) 								
Beremblum, unpub. results, 1949	12 mice	Stock	M	2 mg.[1] in 0.2 ml. tricaprylin	S.C.	0	---	17 mos.
652.--8-HYDROXY-1,2-BENZANTHRACENE 								
Dunlap and Warren, 1941b	Mice	---	---	---	S.C.	0	---	Over 8 mos.
Dunlap and Warren, 1946	5 mice	C3H	M & F	2.0 mgm. once in tricaprylin	S.C.	0	All died 5, 6 mos.	At least 6 mos.
	--do--	Swiss	--do--	--do--	--do--	0	4 alive at 6 mos.	--do--
	14 mice	C3H	--do--	--do--	--do--	0	12 alive at 6 mos.	--do--
653.--10-HYDROXY-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940**	20 mice	C57 brown	M & F	5 mg. crystals, four injections	S.C.	0	---	14 mos.
654.--3-HYDROXY-1,2-BENZANTHRACENE BENZOATE 								
Shear and Leiter, 1940**	20 mice	dba	M & F	10 mg. crystals, 2 injections	S.C.	0	---	14 mos.
Shear, 1941[2]	Mice	---	---	---	S.C.	0	---	8 mos.
655.--3-HYDROXY-1,2-BENZANTHRACENE STEARATE 								
Shear and Leiter 1940**	16 mice	A	M	8 plus 5 mg. crystals	S.C.	0	9 alive at 15 mos.	15 mos.

1. Prepared by Schoental (m.p. 210-220°C).

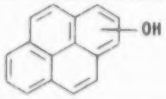
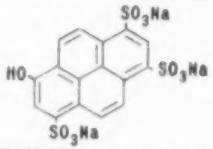
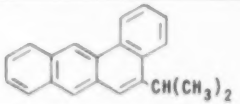
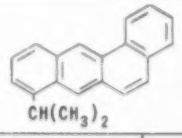
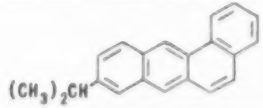
2. Cited by Fieser and Hershberg, 1937b.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
656.--1-HYDROXYCHRYSENE[1] 								
Berenblum, unpub. results, 1949	12 mice	Stock	M	2 mg. in 0.2 ml. tricaprylin	S.C.	0	---	15½ mos.
657.--3-HYDROXYCHRYSENE[1] 								
Berenblum, unpub. results, 1949	10 mice	Stock	M	2 mg. in 0.5 ml. arachis oil	S.C.	1 sarc.	---	58 weeks
658.--4-HYDROXYCHRYSENE[2] 								
Berenblum, unpub. results, 1949	12 mice	Stock	M	2 mg. in 0.2 ml. tricaprylin	S.C.	0[3]	---	17 mos.
659.--6-HYDROXYCHRYSENE[4] 								
Berenblum, unpub. results, 1949	10 mice	Stock	M	2 mg. in 0.5 ml. arachis oil	S.C.	0	---	9 mos.
660.--x-HYDROXYCHRYSENE 								
Domagk, 1938	Mice	---	---	1% in water, 50 applications	Skin	0	---	10 mos.
661.--α-HYDROXY-10-ETHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940**	20 mice	A	M & F	2 plus 5 mg. crystals	S.C.	0	---	15 mos.

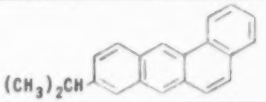
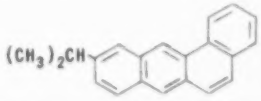
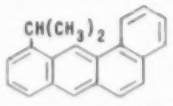
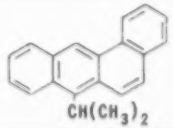
1. Synthesized by Cook and Schoental (J.C.S. 1945) M.P. 281-258° C).
2. Synthesized by Cook and Schoental m.p. 152-153° C.
3. One sarcoma in the peritoneal cavity.
4. Synthesized by Cook and Schoental m.p. 248-250° C.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
662.--10-β-HYDROXYETHYL-1,2-BENZANTHRACENE 								
Badger et al., 1940	10 mice	Stock	---	5 mg. in sesame oil, repeated injections	S.C.	5 sarc.	---	279 days
Badger et al., 1942	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	2 epi., 2 pap.[1]	7 alive at 1 year	527 days
663.--3-HYDROXY-10-METHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940[a]	10 mice	A	M	5 mg. crystals	S.C.	0	5 died early 4 alive at 14 mos.[2]	14 mos.
	--do--	C3H	M	5 mg. crystals	--do--	0	8 died early 4 alive at 14 mos.	--do--
	27 mice	A, dba, Mileaden) & C3H	M & F	1 mg. in lard	S.C.	0	13 died early 4 alive at 14 mos.	--do--
664.--10-HYDROXYMETHYL-1,2-BENZANTHRACENE 								
Badger and Cook, 1940[a]	Mice	---	---	---	---	Tumors	---	---
Badger et al., 1940	10 mice	---	---	0.3% in acetone twice weekly	Skin	7 epi., 1 pap.	---	289 days
	10 mice	---	---	5 mg. in sesame oil, repeated injections	S.C.	10 sarc.[3]	---	238 days
Cook et al., 1940a	Mice	---	---	0.3% in benzene twice weekly	Skin	0[5]	---	---
	Mice	---	---	5 mg. in sesame oil	S.C.	0[6]	---	---
Cook and Kennaway, 1940	10 mice	---	---	---	Inj.	10 sarc.	---	---
	10 mice	---	---	In acetone	Skin	3 epi.	---	---
Shear and Leiter, 1940[a] **	10 mice	A	M	5 plus 5 mg. crystals	S.C.	4[7]	---	19 mos.

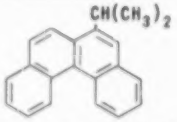
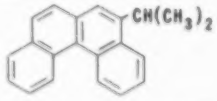
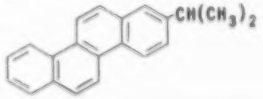
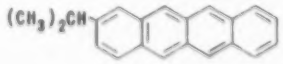
1. Also 2 sebaceous adenomas.
2. 4 Strain A males which had received 5 mg. doses.
3. Also one sebaceous adenoma involving rectum. Metastases to lymph gland by right ureter.
4. Citing work of E. L. Kennaway.
5. No liver lesions.
6. One possible cholangiomatous growth.
7. First at 8 months. Also 4 with lung tumors.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
665.--x-HYDROXYPYRENE 								
Domagk, 1935	Mice	---	---	1% in water, 50 applications	Skin	0	---	10 mos.
666.--3-HYDROXYPYRENE-5,8,10-TRISULFONIC ACID, SODIUM SALT 								
Domagk, 1938	Mice	---	---	1% in water, 50 applications	Skin	0	---	10 mos.
667.--7-ISOPROPENYL-1,2-BENZANTHRACENE, Dimer $C_{42}H_{32}$								
Barry et al., 1935	20 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	10 alive at 6 mos., 4 alive at 1 year	709 days
668.--3-ISOPROPYL-1,2-BENZANTHRACENE 								
Barry et al., 1935	20 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	9 alive at 6 mos., 7 alive at 1 year	554 days
669.--5-ISOPROPYL-1,2-BENZANTHRACENE 								
Badger et al., 1940	20 mice	Stock	---	0.5% in benzene twice	Skin	1 pap., 6 epi.	---	538 days
	10 mice	Stock	---	5 mg. in sesame oil, repeated injections	S.C.	3 sarc.	---	578 days
Cook et al., 1940a	Mice	---	---	---	Skin	0[1]	---	---
	Mice	---	---	---	S.C.	--do--	---	---
670.--6-ISOPROPYL-1,2-BENZANTHRACENE 								
Cook, 1952a	10 mice	---	---	0.3% in benzene[2]	Skin	4[3]	---	13 mos.

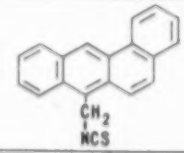
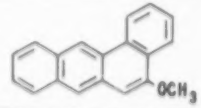
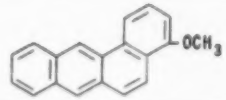
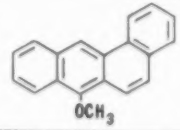
1. No liver lesions.
2. Impure sample.
3. Also one benign tumor and 2 of doubtful malignancy.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
670.--6-ISOPROPYL-1,2-BENZANTHRACENE (Continued) 								
Cook, 1934b	10 mice	Stock	---	0.3% in benzene twice weekly[1]	Skin	4 epi., 3 pap.	8 alive at 6 mos., 4 alive at 1 year	435 days
Cook, 1933a	27 mice	---	---	---	Skin	14 epi., 4 pap.	---	---
Barry, et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly[2]	Skin	5 epi., 1 pap.	8 alive at 6 mos.	584 days
	7 mice	--do--	---	--do--[3]	--do--	5 epi.	6 alive at 6 mos.	275 days
671.--7-ISOPROPYL-1,2-BENZANTHRACENE 								
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	9 alive at 6 mos., 6 alive at 1 year	794 days
672.--8-ISOPROPYL-1,2-BENZANTHRACENE 								
Dunlap and Warren, 1946	20 mice	C3H	M & F	2.0 mgm. in tricaprylin	S.C.	0	13 alive at 6 mos.	At least 6 mos.
673.--10-ISOPROPYL-1,2-BENZANTHRACENE 								
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	6 alive at 6 mos., 3 alive at 1 year	611 days
Shear and Leiter, 1940[4]	20 mice	A & C3H	M	5 mg. crystals, 4 injections	S.C.	0	11 alive at 15 mos.	15 mos.

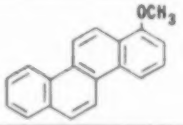
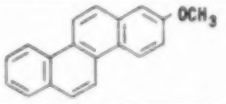
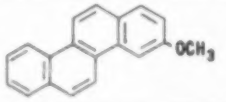
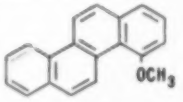
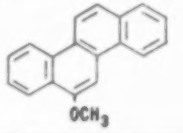
1. Impure. m.p. 114-115°.
2. Pure sample m.p. 131-132°.
3. Sample purified through the quinone, m.p. 132°-133°.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
674.--1-ISOPROPYL-3,4-BENZPHENANTHRENE 								
Badger et al., 1942	10 mice	C3H	---	0.3% in benzene twice weekly	Skin	0	6 alive at 6 mos., 1 alive at 1 year	454 days
	10 mice	--do--	---	5 mg. in glycerol, repeated injections	S.C.	0	9 alive at 6 mos., 2 alive at 1 year	568 days
675.--2-ISOPROPYL-3,4-BENZPHENANTHRENE 								
Badger et al., 1940	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	6 epi., 8 pap.	---	419 days
	10 mice	Stock	---	5 mg. in sesame oil, repeated injections	S.C.	0[1]	---	482 days
	10 mice	--do--	---	5 mg. weekly	P.O.	0	---	448 days
Cook et al., 1940a	Mice	---	---	0.3% in benzene twice weekly	Skin	0[2]	---	418 days
	Mice	---	---	5 mg. in sesame oil	S.C.	--do--	---	370 days
	Mice	---	---	Ca. 5 mg. weekly	P.O.	0[3]	---	394 days
Hewett, 1940	20 mice	---	---	---	Skin	4 epi.	---	12 mos.
676.--2-ISOPROPYLCHRYSENE 								
Hachmann, 1937	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	5 alive at 6 mos., 4 alive at 1 year	471 days
Badger et al., 1940	10 mice	Stock	---	0.2% in lard	S.C.	0	---	471 days
	10 rats	--do--	---	--do--	--do--	0	---	828 days
677.--β-ISOPROPYLNAPHTHACENE 								
Cook, 1934	10 mice	---	---	In benzene	Skin	0	4 alive at 2 years	2 years
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	All alive at 1 year	819 days

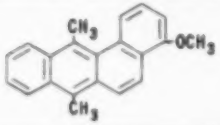
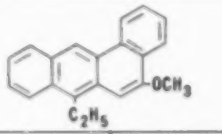
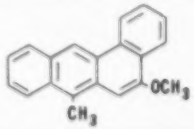
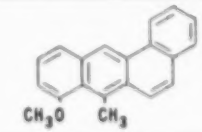
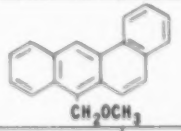
1. Extensive sarcoma of abdominal cavity; squamous papilloma of stomach.
2. One possible cholangiomatous growth.
3. Liver normal.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
678.--10-ISOTHIOCYANOMETHYL-1,2-BENZANTHRACENE 								
Dunlap and Warren, 1946	20 mice	C3H	M & F	2.0 mgm. in tricaprylin	S.C.	0	16 alive at 6 mos.	At least 6 mos.
679.--3-METHOXY-1,2-BENZANTHRACENE 								
Shear, 1941[1]	Mice	---	---	---	---	---	---	---
	--do--	---	---	---	S.C.	Tumors Several	---	---
Shear and Leiter, 1940*	4 mice	A	F	10 mg., crystals	S.C.	0	---	12 mos.
	8 mice	Dba	M	--do--	--do--	1	---	--do--
	10 mice	Dba	F	10 plus 10 plus 5 mg. crystals	--do--	4	5 alive at 9 mos.	15 mos.
680.--4'-METHOXY-1,2-BENZANTHRACENE 								
Dansi et al., 1940	10 rats	---	---	28 mg. in lard, twice, 7 mos. apart	S.C.	0	---	10-12 mos.
Dickens and Weil-Malherbe, 1946	10 mice	---	---	0.15% soln. in benzene twice weekly	Skin	1 pap.[2]	---	10 mos.
	10 mice	---	---	0.3 mgm. in 0.3 ml. sesame oil, single doses	S.C.	0	---	--do--
Berenblum, unpub. results, 1949	10 mice	Inbred	F	2 mg. in 0.5 ml. arachis oil[3]	S.C.	0[4]	---	12 mos.
681.--10-METHOXY-1,2-BENZANTHRACENE 								
Shear, 1938c	Mice	Inbred	---	---	---	Sarc.	---	---
Shear and Leiter, 1940* **	20 mice	A & C3H	M	5 mg. crystals, thrice	S.C.	10	All alive at 1 year	17 mos.

1. Cited by Fieser et al., 1937b.
2. Also lung adenocarcinoma.
3. Synthesized by Schoental, m.p. 159°C.
4. But 3 had mammary carcinoma.

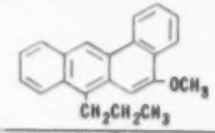
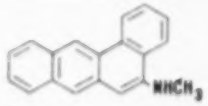
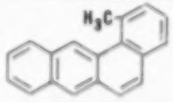
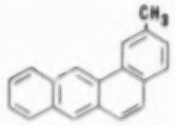
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
682.--1-METHOXYCHRYSENE[1] 								
Berenblum, unpub. results, 1949	10 mice 12 mice	Stock --do--	M M	2 mg. in 0.2 ml. tricaprylin --do--	S.C. S.C.	0 0	--- ---	53 weeks 54 weeks
683.--2-METHOXYCHRYSENE[2] 								
Berenblum, unpub. results, 1949	10 mice 12 mice	Stock Stock	M M	2 mg. in 0.2 ml. tricaprylin 2 mg. in 0.2 ml. tricaprylin	S.C. S.C.	0 0	--- ---	48 weeks 101 weeks
684.--3-METHOXYCHRYSENE[3] 								
Berenblum, unpub. results, 1949	10 mice 10 mice	Inbred Stock	M M	2 mg. in 0.5 ml. arachis oil 2 mg. in 0.5 ml. arachis oil	S.C. S.C.	0 0	--- ---	24 weeks 18 mos.
685.--4-METHOXYCHRYSENE[4] 								
Berenblum, unpub. results, 1949	12 mice	Stock	M	2 mg. in 0.2 ml. tricaprylin	S.C.	0	---	11 mos.
686.--6-METHOXYCHRYSENE[5] 								
Berenblum, unpub. results, 1949	10 mice 12 mice	Stock Stock	M M	2 mg. in 0.2 ml. tricaprylin 2 mg. in 0.2 ml. tricaprylin	S.C. S.C.	0 0	--- ---	50 weeks 101 weeks

1. Synthesized by Cook and Schoental, J.C.S. 1945, m.p. 167-168°C.
2. Synthesized by Cook and Schoental, J.C.S. 1945, m.p. 250-251°C.
3. Synthesized by Cook and Schoental, J.C.S. 1945, m.p. 145-146°C.
4. Synthesized by Cook and Schoental, J.C.S. 1945, m.p. 102-103°C.
5. Synthesized by Cook and Schoental, J.C.S. 1945, m.p. 126-127°C.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
687.--4'-METHOXY-9,10-DIMETHYL-1,2-BENZANTHRACENE 								
Dickens and Weil-Malherbe, 1946	20 mice	---	---	0.15% in benzene twice weekly	Skin	0	---	10 mos.
	--do--	---	---	0.3 mgm. in 0.3 ml. sesame oil, single dose	S.C.	0	---	--do--
688.--3-METHOXY-10-ETHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940*	20 mice	A	F	5 plus 12.5 mg. in lard plus 5 mg. crystals	S.C.	1	9 alive at 18 mos.	18 mos.
689.--3-METHOXY-10-METHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940* **	20 mice	A	F	5 plus 12.5 mg. in lard plus 5 mg. crystals	S.C.	4[1]	---	18 mos.
	3 mice	A	M & F	10 mg. crystals	S.C.	0	---	9 mos.
	--do--	C3H	--do--	--do--	S.C.	3	---	--do--
690.--5-METHOXY-10-METHYL-1,2-BENZANTHRACENE 								
Newman and Rise, 1941	10 mice	---	---	---	S.C.	0	---	10 mos.
Dunlap and Warren, 1946	10 mice	Swiss	M & F	2.0 mgm. in tricaprylin	S.C.	0[2]	6 alive at 6 mos.	At least 6 mos.
	20 mice	C3H	--do--	--do--	S.C.	7	15 alive at 2 days	--do--
691.--10-METHOXYMETHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940* **	10 mice	A	M	5 mg. crystals, repeated injections	S.C.	0	---	18 mos.

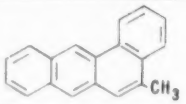
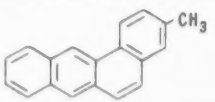
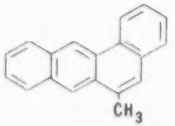
1. First within 9 months.

2. One mouse with pulmonary adenoma.

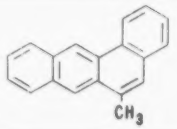
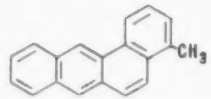
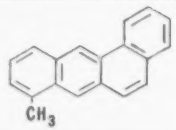
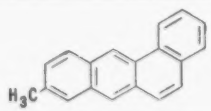
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
692.--3-METHOXY-10-PROPYL-1,2-BENZANTHRACENE 								
Andervont and Shimkin, 1940	5 mice	A	---	0.25 mg. in aqueous suspension, single injection	I.V.	0	---	20 weeks
	20 mice	A	M & F	0.5 mg. in tricaprylin	S.C.	0[1]	---	14 weeks
Shear and Leiter, 1940*	20 mice	A	M	5 plus 12.5 mg. in lard plus 5 mg. crystals	S.C.	0	12 alive at 15 mos.	18 mos.
693.--3-METHYLAMINO-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940**	20 mice	Mileagen	M & F	5 mg. crystals, twice	S.C.	0	---	14 mos.
694.--1'-METHYL-1,2-BENZANTHRACENE 								
Shear, 1940a	Mice	---	---	Crystals	S.C.	0	---	5 mos.
Badger et al., 1940	20 mice	Stock	---	0.5% in benzene twice weekly	Skin	1 (?) pap.	---	410 days
	10 mice	Stock	---	5 mg. in sesame oil, repeated injections	S.C.	0	---	628 days
Cook et al., 1940a	Mice	---	---	---	Skin	0[2]	---	---
	Mice	---	---	---	S.C.	--do--	---	---
Shear and Leiter, 1940**	20 mice	A	M & F	5 mg. crystals	S.C.	0	12 alive at 15 mos.	21 mos.
695.--2'-METHYL-1,2-BENZANTHRACENE 								
Harry et al., 1955	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	6 alive at 6 mos., 5 alive at 1 year	660 days

1. But 2 animals had lung tumors.

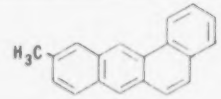
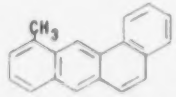
2. No liver lesions.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
696.--3-METHYL-1,2-BENZANTHRACENE 								
Barry et al., 1935	14 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	9 alive at 6 mos., 4 alive at 1 year	468 days
Cook[1]	Mice	---	---	---	S.C.	3 sarc.	---	---
Kennaway[2]	Mice	---	---	---	S.C.	10 sarc.	---	---
Kennaway[3]	20 mice	---	---	---	S.C.	1 epi.[4]	8 alive at 417 days	417 days
Orr, 1938	10 mice	Stock	---	0.3% in benzene weekly	Skin	0	---	18 weeks
	--do--	--do--	---	0.3% in acetone weekly	--do--	0	---	At least 21 weeks
Badger et al., 1940	92 mice	Stock	---	0.3% in benzene twice weekly	Skin	2 epi., 2 pap.	---	707 days
	20 mice	Stock	---	5 mg. in sesame oil, repeated injections	S.C.	10 sarc.	---	276 days
Cook et al., 1940a	Mice	---	---	---	Skin	0[5]	---	---
	Mice	---	---	---	S.C.	--do--	---	---
Cook and Kennaway, 1940	128 mice	---	---	---	Skin	2 epi., 2 pap.	---	---
	20 mice	---	---	---	S.C.	10 sarc.	---	---
697.--3'-METHYL-1,2-BENZANTHRACENE 								
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	3 alive at 6 mos., 3 alive at 1 year	924 days
698.--4-METHYL-1,2-BENZANTHRACENE 								
Cook, 1933a	Mice	---	---	---	Skin	1 pap.	---	---
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	3 alive at 6 mos.	312 days
Shear, 1938a	20 mice	---	---	Crystals	S.C.	3	---	3 mos.

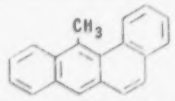
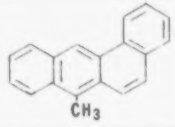
1. Unpub. results cited by Orr, 1938.
2. Unpub. results cited by Haddow, 1938a.
3. Unpub. results cited by Haddow, 1938b.
4. After 417 days.
5. No liver lesions.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
698.--4-METHYL-1,2-BENZANTHRACENE (Continued) 								
Cook et al., 1940a	Mice	---	---	---	Skin	0[1]	---	---
	--do--	---	---	---	S.C.	--do--	---	---
Shear and Leiter, 1941b**	20 mice	A	M & F	2 mg. crystals	S.C.	15	3 neg. alive at 11 mos.	14 mos.
699.--4'-METHYL-1,2-BENZANTHRACENE 								
Badger et al., 1940	40 mice	Stock	---	0.3% in benzene twice weekly	Skin	1 epi.	---	622 days
700.--5-METHYL-1,2-BENZANTHRACENE 								
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	5 epi., 2 pap.	8 alive at 6 mos., 6 alive at 1 year	433 days
Bachmann et al., 1937	10 mice	Stock	---	--do--	--do--	5 epi.[2]	8 alive at 6 mos., 4 alive at 1 year	435 days
Shear, 1938a	20 mice	A	M	--do--	S.C.	16	2 neg. alive at 9 mos.	9 mos.
Shear, 1941[3]	20 mice	---	---	5 mg. crystals	S.C.	0	---	37 days
Shear, 1941[4]	20 mice	---	---	Crystals	S.C.	18	---	8 mos.
701.--6-METHYL-1,2-BENZANTHRACENE 								
Cook, 1933a	10 mice	---	---	---	Skin	2 epi.	---	---
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	--do--	2 epi., 1 pap.	8 alive at 6 mos., 5 alive at 1 year	717 days
Pullinger, 1945	31 mice	Simpson, MRC, Hunt	---	0.1% in acetone twice weekly	Skin	2	19 alive at 300 days	300 days

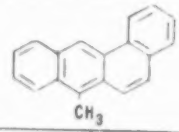
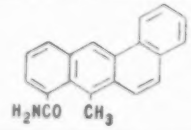
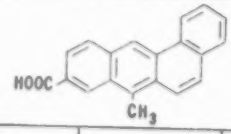
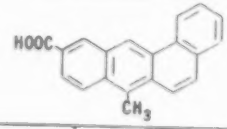
1. No liver lesions.
2. First tumor in 270 days, 5 tumors in 335 days.
3. Unpublished results cited by Fieser and Newman, 1936.
4. Unpublished results cited by Fieser and Hershberg, 1937b.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
70. -7-METHYL-1,2-BENZANTHRACENE 								
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	5 alive at 6 mos., 4 alive at 1 year	563 days
Kennaway[1]	Mice	---	---	---	---	4 sarc.	---	---
Kennaway[2]	8 mice	---	---	---	S.C.	1 sarc.	---	At least 307 days
Orr, 1938	10 mice	Stock	---	0.3% in benzene weekly	Skin	0	---	23 weeks
	--do--	--do--	---	0.3% in acetone weekly	--do--	0	---	--do--
Shear, 1938a	19 mice	A	M	5 mg. crystals[6], repeated injections	S.C.	2	12 neg. alive at 16 mos.	18 mos.
Shear, 1938c	--do--	Inbred	---	---	---	1 sarc.	---	14 mos.
Orr, 1939	5 mice	White	M & F	5 mg. in paraffin	Skin	0	Majority killed	349 days
	--do--	--do--	--do--	--do--[3]	--do--	0	--do--	--do--
	--do--	--do--	--do--	--do--[4]	--do--	0	--do--	--do--
Badger et al., 1940	30 mice	Stock	---	0.3% in benzene twice weekly	Skin	2 pap.	---	687 days
	20 mice	Stock	---	5 mg. in sesame oil, repeated injections	S.C.	4 sarc.	---	309 days
Cook et al., 1940a	Mice	---	---	---	Skin	0[5]	---	---
	Mice	---	---	---	S.C.	--do--	---	---
703.--8-METHYL-1,2-BENZANTHRACENE 								
Badger et al., 1940	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	1 epi., 1 pap.	---	682 days
Cook et al., 1940a	Mice	---	---	---	Skin	0[5]	---	---
	Mice	---	---	---	S.C.	--do--	---	---
Shear and Leiter, 1941b[**]	20 mice	A	M & F	3 plus 5 plus 5 mg. crystals	S.C.	0	17 alive at 1 year, 8 alive at 17 mos.	17 mos.

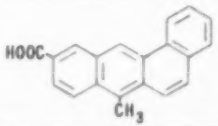
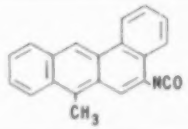
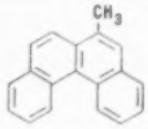
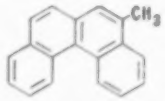
1. Unpub. results cited by Haddow, 1938a.
2. Unpub. results cited by Haddow, 1938b.
3. Methylcholanthrene applied S.C. at a different site.
4. Pyrene applied S.C. at a different site.
5. No liver lesions.
6. M.p. 183.0 - 183.5° C cor.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
704.--9-METHYL-1,2-BENZANTHRACENE 								
Shear, 1937b	Mice	Inbred	---	---	S.C.	0	---	10 weeks
Shear, 1941[1]	20 mice	---	---	---	---	1	---	3½ mos.
Cook and Kennaway, 1938	20 mice	---	---	---	Skin	2 epi., 1 pap.	2 neg. alive at 11½ mos.	11½ mos.
Shear, 1938a	20 mice	A	M	1 mg. in lard, repeated injections	S.C.	17	3 neg. alive at 9 mos.	9 mos.
Shear, 1938b	20 mice	Inbred	---	---	---	17 sarc.	---	8 mos.
Badger, 1940	40 mice	Stock	---	0.3% in benzene twice weekly	Skin	5 epi., 3 pap.	---	528 days
Cook et al., 1940a	Mice	---	---	---	Skin	0[2]	---	---
705.--10-METHYL-1,2-BENZANTHRACENE 								
Bachmann et al., 1937	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	1 epi.[3], 1 pap.	4 alive at 130 days	---
	10 mice	Stock	---	--do--	--do--	1 par.[4]	3 alive at 135 days	---
Cook et al., 1937	Mice	---	---	---	Skin (3)	0	---	130 days
Shear, 1938a*	20 mice	A	M	5 mg. crystals	S.C.	18	0 neg. alive at 9 mos.	9 mos.
	10 mice	A	M	--do--	--do--	8	0 neg. alive at 6 mos.	6 mos.
	10 mice	C3H	M	1 mg. in lard	--do--	9	0 neg. alive at 6 mos.	--do--
	10 mice	--do--	F	--do--	--do--	7	1 neg. alive at 6 mos.	--do--
Shear, 1938c	Mice	Inbred	---	As crystals or in lard	---	Sarc.	---	---
	--do--	--do--	---	---	Skin	Epi.	---	---
Badger et al., 1940	70 mice	Stock	---	0.3% in benzene twice weekly	Skin	20 epi., 4 pap.[5]	---	280 days
Salt and Shear, 1940	20 mice	A	M & F	0.05 mg. in lard	S.C.	7	9 neg. alive at 11 mos.	11 mos.

1. Unpub. results cited by Newman, 1937.
2. No liver lesions.
3. First tumor at 130 days.
4. First tumor at 135 days.
5. Metastases in lungs.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
705.--10-METHYL-1,2-BENZANTHRACENE (Continued) 								
Shear and Leiter, 1940	20 mice	A	M & F	0.3% in benzene twice weekly for 7 mos.	Skin	4 epi., 3 pap.	1 neg. alive at 16 mos.	16 mos.
	20 mice	A	M & F	0.02% in benzene twice weekly for 7 mos.	--do--	1 pap.	5 neg. alive at 16 mos.	16 mos.
Shear, 1941[1]	20 mice	---	---	5 mg. crystals	S.C.	0[2]	---	57 days
Shear, 1941[3]	20 mice	---	---	5 mg.	S.C.	15	---	4 mos.
Shear, 1941[4]	10 mice	A	---	Crystals	S.C.	5[5]	---	5 mos.
	20 mice	A	---	0.3% in benzene three times weekly	Skin	6 pap.	17 alive at 5 mos.	5 mos.
Dunlap and Aarren, 1946	10 mice	Swiss	M & F	5.0 mg. in tricaprylin	S.C.	2[6]	---	At least 9 mos.
706.--10-METHYL-1,2-BENZANTHRACENE-5-CARBONAMIDE 								
Sall and Shear, 1940	20 mice	A	M & F	2.1 mg. in lard	S.C.	5	11 alive neg. at 11 mos.	11 mos.
Shear and Leiter, 1940**	20 mice	A	M & F	2 mg. crystals	S.C.	14	---	11 mos.
707.--10-METHYL-1,2-BENZANTHRACENE-6-CARBOXYLIC ACID 								
Shear and Leiter, 1940	20 mice	A	M & F	2 mg. crystals	S.C.	0	11 alive at 6 mos.	10 mos.
708.--10-METHYL-1,2-BENZANTHRACENE-7-CARBOXYLIC ACID 								
Shear and Leiter, 1940**	10 mice	C3H	M	5 mg. crystals	S.C.	0	9 alive at 6 mos., 2 alive at 9 mos.	9 mos.

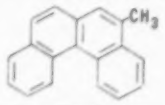
1. Unpublished results cited by Fieser and Newman, 1936.
2. Ulceration or thickening of tissue in 15 animals.
3. Unpublished results cited by Fieser and Hershberg, 1937a.
4. Unpublished results cited by Newman and Orchin, 1938.
5. First tumors in 57 days.
6. Average induction time 128 days. 2 mice with pulmonary adenoma in 95 and 231 days.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
708.--10-METHYL-1,2-BENZANTHRACENE-7-CARBOXYLIC ACID (Continued) 								
Shear, 1941[1]	Mice	---	---	---	S.C.	0	---	4 mos.
709.--9-METHYL-1,2-BENZANTHRYL-10-ACETIC ACID[8]								
Shabad, 1945	Mice	---	---	---	---	0	---	---
710.--10-METHYL-1,2-BENZANTHRYL-3-ISOCYANATE 								
Dunlap and Warren, 1944	20 mice	C3H	M & F	2.0 mgm. in tricaprylin	S.C.	0	14 alive at 6 mos.	At least 6 mos.
711.--1-METHYL-3,4-BENZPHENANTHRENE 								
Berger et al., 1940	20 mice	Stock	---	0.5% in benzene twice weekly	Skin	5 epi., 2 pap.	---	335 days
	10 mice	--do--	---	5 mg. in sesame oil, repeated injections	S.C.	0	---	329 days
	10 mice	--do--	---	5 mg. weekly	P.O.	0	---	527 days
Cook et al., 1940a	Mice	---	---	0.5% in benzene twice weekly	Skin	0[2]	---	335 days
	--do--	---	---	5 mg. in sesame oil	S.C.	0[3]	---	329 days
	--do--	---	---	Ca 5 mg. weekly	P.O.	0[4]	---	272 days
Hewett, 1940	20 mice	---	---	---	Skin	4 epi., 2 pap.	---	335 days
712.--2-METHYL-3,4-BENZPHENANTHRENE 								
Bachmann et al., 1937	20 mice	Stock	---	0.5% in benzene twice weekly	Skin	7 epi.,[5] 5 pap.[5]	16 alive at 6 mos.	300 days
Cook et al., 1940a	Mice	---	---	5 mg. in sesame oil	S.C.	0[6]	---	460 days
	--do--	---	---	Ca. 5 mg. weekly	P.O.	0[7]	---	356 days

1. Unpublished results cited by Fieser and Hershberg, 1957b.
2. 4 cholangiomatous growths out of 10 livers examined.
3. 1 cholangiomatous growth out of 8 livers examined.
4. 3 cholangiomatous growths out of all livers examined.
5. First tumor at 115 days and 10 tumors at 165 days.
6. 3 cholangiomatous growths and one more possible out of 15 livers examined.
7. 3 cholangiomatous growths and one possible hepetomatous growth out of 8 livers examined.
8. For formula see Addenda.

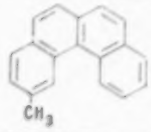
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

712.--2-METHYL-3,4-BENZPHENANTHRENE (Continued)



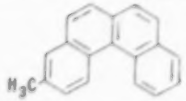
Lindenvont and Shimkin 1940	10 mice 18 mice[3]	A A	--- ---	0.25 mg. in aq. susp., single injection[1] 1 mg. in sesame oil	I.V. S.C.	2[2] 4 sarc.[4]	--- ---	20 weeks 40 weeks
Badger et al., 1940	20 mice 20 mice 10 mice	--- --- ---	--- --- ---	0.3% in benzene twice weekly 5 mg. in sesame oil, repeated injections 5 mg. weekly	Skin S.C. P.O.	7 epi., 5 pap. 5 sarc., 2 epi.	--- --- ---	300 days 459 days 585 days
Shear and Leiter, 1941b	20 mice	A	M & F	2 plus 1 mg. crystals	S.C.		14 alive at 9 mos.	12 mos.
Shear, 1941	20 mice	A	M & F	2 mg. crystals, repeated injections	S.C.		---	11 mos.

713.--6-METHYL-3,4-BENZPHENANTHRENE



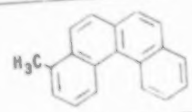
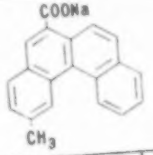
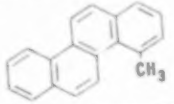
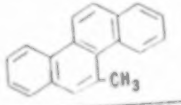
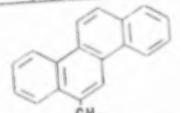
Badger et al., 1940	20 mice 10 mice 10 mice	--- --- ---	--- --- ---	0.3% in benzene twice weekly 5 mg. in sesame oil, repeated injections 5 mg. weekly	Skin S.C. P.O.	6 pap. 2 sarc.,[5] 1 carc.[6]	--- --- ---	678 days 674 days 637 days
Cook et al., 1940	Mice --do-- --do--	--- --- ---	--- --- ---	0.3% in benzene twice weekly 5 mg. in sesame oil Ca. 5 mg. weekly	Skin S.C. P.O.	0 0 1[7]	--- --- ---	678 days 674 days 658 days
Hewett, 1940	Mice Mice	--- ---	--- ---	In benzene In benzene	Skin Inj.	Tumors --do--	--- ---	--- ---

714.--7-METHYL-3,4-BENZPHENANTHRENE

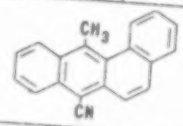
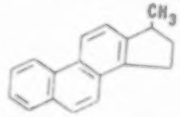
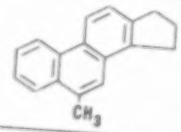
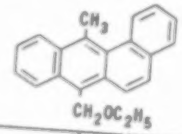


Badger et al., 1940	20 mice 10 mice 10 mice	Stock Stock Stock	--- --- ---	0.3% in benzene twice weekly 5 mg. in sesame oil, repeated injections 5 mg. weekly	Skin S.C. P.O.	2 epi., 1 pap. 0 0	--- --- ---	641 days 624 days 620 days
Cook et al., 1940a	Mice Mice Mice	--- --- ---	--- --- ---	0.3% in benzene twice weekly 5 mg. in sesame oil Ca. 5 mg. weekly	Skin S.C. P.O.	0[8] --do-- 0[9]	--- --- ---	544 days 495 days 590 days
Hewett, 1940	Mice Mice	--- ---	--- ---	In benzene --do--	Skin S.C.	Tumors --do--	--- ---	--- ---

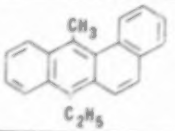
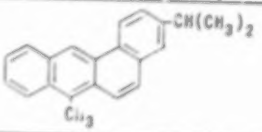
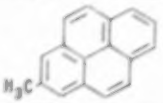
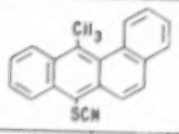
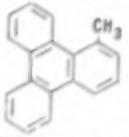
1. M.P. 70.5-71.1° Corr. by J.L.H.
2. Of the lung. First at 8 weeks.
3. Affective total.
4. Also, of 8 examined, all had lung tumors.
5. Also one small round - celled tumor of the testis.
6. Of small intestine; also one papilloma of stomach.
7. Cholanglomatous growth and other possibly.
8. No liver changes.
9. 2 possible hepatomatous growths in 6 livers examined.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
715.--8-METHYL-3,4-BENZPHENANTHRENE 								
Badger et al., 1940	20 mice	Stock	---	0.5% in benzene twice weekly	Skin	2 epi., 2 pap.	---	584 days
	10 mice	Stock	---	5 mg. in sesame oil, repeated injections	S.C.	0[1]	---	482 days
	10 mice	Stock	---	5 mg. weekly	P.O.	0	---	498 days
Cook et al., 1942a	Mice	---	---	0.5% in benzene twice weekly	Skin	0[2]	---	585 days
	Mice	---	---	5 mg. in sesame oil	S.C.	---do---	---	512 days
	Mice	---	---	Ca. 5 mg. weekly	P.O.	---do---	---	505 days
Hewett, 1940	Mice	---	---	In benzene ---	Skin inj.	Tumors ---do---	--- ---	--- ---
	Mice	---	---					
716.--6-METHYL-3,4-BENZPHENANTHRENE-10-CARBOXYLIC ACID, SODIUM SALT 								
Badger et al., 1940	10 mice	Stock	---	In aq. soln.	S.C.	0	---	479 days
Cook et al., 1942a	Mice	---	---	---	S.C.	0[3]	---	---
717.--4-METHYL CHRYSENE 								
Dunlap and Warren, 1941	25 mice	C3H	M	2 or 4 mg. in tricaprylin	S.C.	1 sarc.[4]	---	At least 170 days
	5 mice	Swiss	M	4 mg. in tricaprylin	S.C.	0	---	Over 6 mos.
718.--5-METHYL CHRYSENE 								
Dunlap and Warren, 1941	20 mice	C3H	M	2 mg. in tricaprylin	S.C.	10 sarc.	---	Over 136 days
	20 mice	Swiss	M	---do---	S.C.	0	---	Over 6 mos.
719.--6-METHYL CHRYSENE 								
Newman, 1940 Shear and Leiter, 1941b	20 mice	A	---	---	S.C.	1 sarc.	---	18 mos.
	20 mice	A	M & F	2 plus 2 mg. crystals	S.C.	1 sarc.	16 alive at 9 mos., 9 alive at 1 year	16 mos.

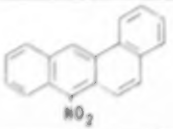
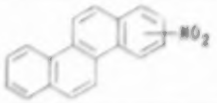
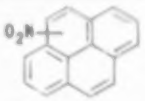
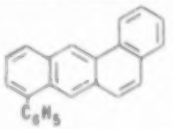
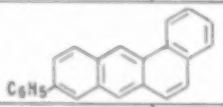
1. One stomach papilloma.
2. No liver changes.
3. No liver lesions.
4. At 170 days; also one epidermoid and one sarcoma of scrotum.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
720.--9-METHYL-10-CYANO-1,2-BENZANTHRACENE 								
Badger et al., 1940	10 mice	C3H	---	0.3% in benzene twice weekly	Skin	6 epi., 2 pap.	---	180 days
	10 mice	C3H	---	5 mg. in sesame oil, repeated injections	S.C.	7 sarc.	---	169 days
Cook et al., 1940a	Mice	---	---	---	Skin	0[1]	---	---
	Mice	---	---	---	S.C.	--do--	---	---
721.--3'-METHYL-CYCLOPENTENOPHENANTHRENE (Diels hydrocarbon) 								
Craciun et al., 1939	20 mice	---	---	Crystals[2]	S.C. neck	0[4]	---	---
Butenandt and Suranyi, 1942	20 mice	BIH	M & F	0.4% in benzene, 1 drop twice weekly	Skin	0	2 alive at 1 year	Over 1 year
	20 mice	--do--	--do--	5 mg. in sesame oil	S.C.	0	5 males alive at 7 mos. 4 females alive at 5 mos.	Over 7 mos.
722.--9-METHYL-CYCLOPENTENOPHENANTHRENE 								
Butenandt and Suranyi, 1942	10 mice	BIH	M & F	0.5% in benzene, 1 drop twice weekly	Skin	0	6 alive at 14 mos.	14 mos.
	5 mice	--do--	M	5 mg. in sesame oil, seven injections	S.C.	0	3 alive at 14 mos.	--do--
723.--9-METHYL-10-ETHOXYMETHYL-1,2-BENZANTHRACENE 								
Dunlap and Warren, 1946	20 mice	C3H	M & F	2.0 mgm. in tricaprylin	S.C.	6[3]	19 alive at 176 days	9 mos.

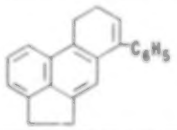
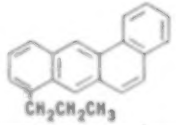
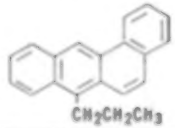
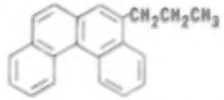
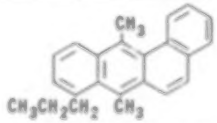
1. No liver lesions.
2. M.P. 124-125°.
3. One mouse with pulmonary adenoma.
4. 2 tumors in right axillary region. First tumor at 2 weeks. Glandular Epitheliomas with cystic papillomatous tendencies. One tumor gave positive grafts.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
724.--9-METHYL-10-ETHYL-1,2-BENZANTHRACENE 								
Shabad, 1940[1]	Mice	---	---	6 mg.	S.C.	Sarc.	---	4 mos.
725.--10-METHYL-3'-ISOPROPYL-1,2-BENZANTHRACENE[3] 								
Shear, 1961[2]	Mice	---	---	Crystals	S.C.	0	---	---
726.--4-METHYLPYRENE 								
Barry et al., 1959	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	10 alive at 6 mos., 5 alive at 490 days	490 days
727.--9-METHYL-10-THIOCYANO-1,2-BENZANTHRACENE 								
Dunlap and Warren, 1946	20 mice 20 mice	C3H --do--	M & F --do--	2.0 mgm. in tricaprylin --do--	S.C. --do--	0 0	17 alive at 6 mos. 16 alive at 6 mos.	At least 6 mos. --do--
728.--1-METHYLTRIPHENYLENE 								
Shear, 1961	20 mice	A	M & F	5 mg. crystals, repeated injections	S.C.	0	---	Over 1 year
729.--NAPHTHACENE								
Kennaway and Hieger, 1930 Barry et al., 1959	Mice 10 mice	--- Stock	--- ---	--- 0.3% in benzene twice weekly	Skin Skin	0 0	--- 10 alive at 6 mos., 8 alive at 1 year	--- 508 days

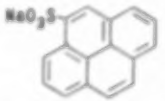
1. Cited by Mikhailov and Blokhina, 1940.
2. Cited by Newman and Joshel, 1940.
3. Called incorrectly 2-isopropyl-8-methyl-3,4-benphenanthrene (see Fieser and Clapp, 1941.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
730.--10-NITRO-1,2-BENZANTHRACENE 								
Shear and Leiter, 1941**	20 mice	A	M & F	22 mg. (over 5 injections) crystals	S.C.	0	2 alive at 20 mos.	20 mos.
731.--x-NITROCHRYSENE 								
Shmagk, 1958	Mice	---	---	1% in water, 50 applications	Skin	0	---	10 mos.
732.--x-NITROPYRENE 								
Shmagk, 1958	Mice	---	---	1% in water, 50 applications	Skin	0	---	10 mos.
733.--PERHYDROCHRYSENE $C_{18}H_{30}$								
Kennaway, 1930	Mice	---	---	In benzene[1]	Skin	0	---	---
735.--5-PHENYL-1,2-BENZANTHRACENE 								
Badger et al., 1940	10 mice	---	---	0.3% in benzene twice weekly	Skin	1 epi.	---	485 days
736.--6-PHENYL-1,2-BENZANTHRACENE 								
Harry et al., 1955	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	12 alive at 6 mos., 6 alive at 1 year	651 days

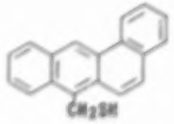
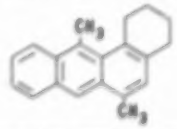
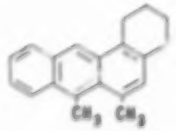
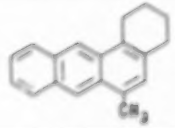
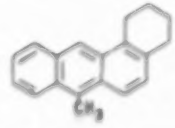
1. Substance impure.

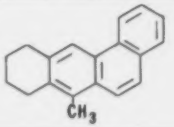
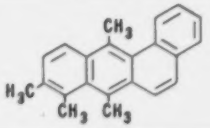
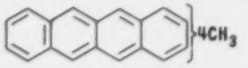
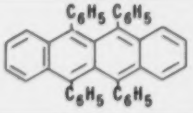
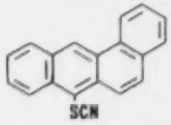
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
737.--1-PHENYL-3,4-DIHYDRO-8,9-ACEPHENANTHRENE 								
Shear, 1938a	14 mice	A	M & F	10 mg. crystals	S.C.	0	4 alive at 18 mos.	18 mos.
738.--5-n-PROPYL-1,2-BENZANTHRACENE 								
Bachmann et al., 1937	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	3 epi., 3 pap.	15 alive at 6 mos.	347 days
739.--10-n-PROPYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940*	20 mice	A & C3H	M	5 mg. crystals, thrice	S.C.	0	10 alive at 15 mos.	15 mos.
740.--2-n-PROPYL-3,4-BENZPHENANTHRENE 								
Badger et al., 1942	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	6 epi.[2]	6 alive at 6 mos.	549 days
	10 mice	--do--	---	5 mg. in sesame oil, repeated injections	S.C.	0[1]	9 alive at 6 mos.	446 days
741.--5-n-PROPYL-9,10-DIMETHYL-1,2-BENZANTHRACENE 								
Bradbury, 1941	15 mice	Inbred	---	0.3% in acetone twice weekly	Skin	5 epi.	All died at 8 mos.	8 mos.
	14 mice	--do--	---	0.3% in benzene twice weekly	--do--	3 epi.	1 neg. alive at 6 mos.	6 mos.
	11 mice	--do--	---	5 mg. in sesame oil	S.C.	4 sarc.	---	9 mos.
	8 mice	--do--	---	5 mg. in propylene glycol	S.C.	2 sarc.	---	6 mos.

1. 2 stomach papillomas; one mouse with carcinoma in upper end of both ureters.
2. Including one malignant sebaceous adenoma.

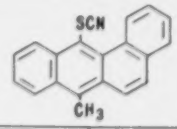
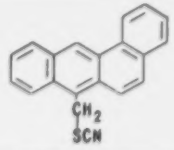
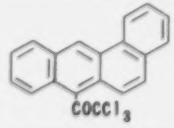
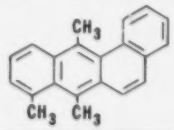
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
742.--PYRENE								
Bloch, 1922	Mice	---	---	---	Skin	0	---	---
Barry et al., 1955	5 mice	Stock	---	1% in benzene twice weekly[1]	Skin	1 pap.	3 alive at 6 mos., 3 alive at 1 year	634 days
	20 mice	--do--	---	1% in benzene twice weekly[2]	--do--	--do--	15 alive at 6 mos., 8 alive at 1 year	600 days
	20 mice	--do--	---	1% in benzene twice weekly[4]	--do--	--do--	18 alive at 6 mos., 5 alive at 1 year	717 days
Haddow et al., 1957	12 rats	Lister	M & F	10 mg. in sesame oil	I.P.	0	---	100 days
Orr, 1938	15 mice	White	M & F	5 mg. in paraffin, 2 pellets	1 in each flank	0[3]	---	387 days
White and White, 1939	Rats	---	M	0.2% in food	P.O.	0	---	100 days
Badger et al., 1940	40 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	---	680 days
White, A. and White, J., 1940	10 rats	---	M & F	70 mg. in sesame oil	I.P.	0	---	93 days
Shear and Leiter, 1941b	30 mice	A	---	10 plus 10 mg. crystals	S.C.	0	23 alive at 1 year, 9 alive at 18 mos.	18 mos.
Elson and Harris, B.J.C., 1947	5 rats	Wistar	M	50 mg.	I.P.	0	---	33-47 days
743.--PYRENE-2-SULFONIC ACID, SODIUM SALT 								
Domagk, 1938	Mice	---	---	1% in water, 50 applications	Skin	0	---	10 mos.
744.--β-(3-PYRENOIL)-PROPIONIC ACID								
Domagk, 1938	Mice	---	---	1% in water, 50 applications	Skin	0	---	10 mos.

1. Crude sample derived from coal tar, yellow in color.
2. Crude sample, above, purified through picrate but still tinted yellow.
3. No histological changes noted.
4. Pure sample, derived from coal tar obtained from a commercial firm, tinted yellow.

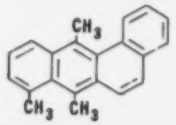
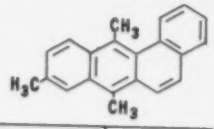
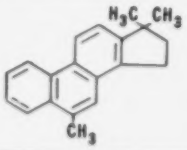
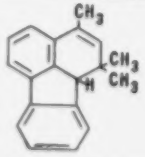
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
745.--10-SULFHYDRYLMETHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940**	10 mice	A	M	5 mg. crystals, twice	S.C.	0	9 alive at 1 year	19 mos.
746.--1',2',3',4'-TETRAHYDRO-4,9-DIMETHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1941b**	20 mice	A	M & F	2 plus 5 plus 5 mg. crystals	S.C.	0	17 alive at 1 year	16 mos.
747.--1',2',3',4'-TETRAHYDRO-4,10-DIMETHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940	20 mice	A	M & F	2 plus 5 mg. crystals	S.C.	0	3 alive at 14 mos.	14 mos.
748.--1',2',3',4'-TETRAHYDRO-4-METHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1941**	20 mice	A	M & F	2 mg. plus 5 mg. plus 9 mg crystals	S.C.	1	11 neg. alive at 11 mos.	19 mos.
749.--1',2',3',4'-TETRAHYDRO-10-METHYL-1,2-BENZANTHRACENE 								
Shear, 1938a	10 mice	A	---	5 mg. crystals	S.C.	0	7 neg. alive at 7 mos.	9 mos.
Shear and Leiter, 1940**	10 mice	A	M	9 mg. crystals, twice	S.C.	0	---	16 mos.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
750.--5,6,7,8-TETRAHYDRO-10-METHYL-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940**	20 mice	A & C3H	M	5 mg. crystals, twice	S.C.	0	6 alive at 15 mos.	15 mos.
751.--TETRAHYDRONAPHTHACENE $C_{18}H_{16}$								
Kennaway, 1930[1]	Mice	---	---	In benzene	Skin	0	---	---
Kennaway and Hieger, 1930	---do---	---	---	---	Skin	0	---	---
752.--5,6,9,10-TETRAMETHYL-1,2-BENZANTHRACENE 								
Badger et al., 1940	20 mice	---	---	0.3% in benzene twice weekly	Skin	8 epi., 1 pap.	---	202 days
	10 mice	---	---	2 mg. in sesame oil	S.C.	1 sarc.	---	212 days
Cook et al., 1940a	Mice	---	---	0.3% in benzene twice weekly	Skin	0[2]	---	---
	Mice	---	---	5 mg. in sesame oil	S.C.	1[3]	---	---
753.--TETRAMETHYLNAPHTHACENE 								
Velluz, 1938	Mice	---	---	In benzene	Skin	0	---	10 mos.
754.--9,10,11,12-TETRAPHENYLNAPHTHACENE 								
Velluz, 1938	Mice	---	---	In benzene	Skin	0	---	10 mos.
755.--10-THIOCYANO-1,2-BENZANTHRACENE 								
Dunlap and Warren, 1946	20 mice	C3H	M & F	2.0 mgm. in tricaprylin	S.C.	0	14 alive at 6 mos.	At least 6 mos.

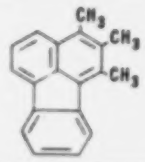
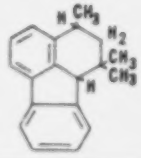
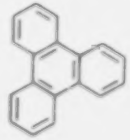
1. Substance is named 2,3-Tetrahydrobenzanthracene in original paper.
2. No liver lesions.
3. Cholangiomatous growth.

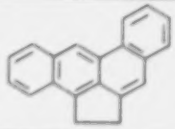
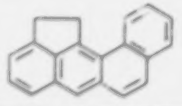
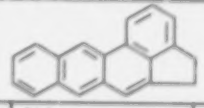
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
756.--9-THIOCYANO-10-METHYL-1,2-BENZANTHRACENE 								
Dunlap and Warren, 1946	15 mice	C3H	M & F	2.0 mgm. in tricaprylin	S.C.	0	15 alive at 6 mos.	At least 6 mos.
757.--10-THIOCYANOMETHYL-1,2-BENZANTHRACENE 								
Dunlap and Warren, 1946	20 mice	C3H	M & F	2.0 mgm. in tricaprylin	S.C.	0	13 alive at 6 mos.	At least 6 mos.
758.--10-TRICHLOROACETYL-1,2-BENZANTHRACENE 								
Dansi et al., 1938	7 rats	---	---	8-12 mg. in lard once (two animals had 2 injections)	S.C.	2	---	12 mos.
	4 mice	---	---	2 mg. in lard	S.C.	2	---	12 mos.
	8 rats	---	---	10 mg.	S.C.	2	---	8-12 mos.
759.--5,9,10-TRIMETHYL-1,2-BENZANTHRACENE 								
Bachmann et al., 1938	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	5 pap.[3]	14 alive at 70 days	115 days
Badger et al., 1940	26 mice	Stock	---	0.06% in benzene twice weekly	Skin	10 epi., 7 pap.	---	193 days
	40 mice	Stock	---	0.3% in benzene twice weekly	Skin	6 pap.	---	119 days
	10 mice	Stock	---	5 mg. in sesame oil, repeated injections	S.C.	4 sarc.	---	231 days
Cook and Kennaway, 1940	Mice	---	---	0.06% in benzene	Skin	Epi.	---	---
Pullinger, 1943	30 mice	Simpson	---	0.05% in acetone twice weekly for 9 weeks	Skin[1]	22[2]	30 alive at 9 weeks	63 weeks
Hartwell and Stewart, 1942	13 mice	dba	M & F	0.06% in benzene twice weekly	Skin	13 carc.[4]	---	271 days

1. At first appearance of papilloma (9 weeks), skin excised from treated area.
2. Carcinoma including one sarcoma; also papillomas.
3. First tumor in 31 days. Many other tumors appeared and regressed.
4. Also metastases to lymph node and lung; Pigmented foci.

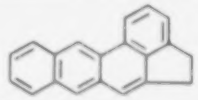
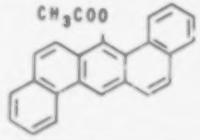
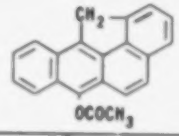
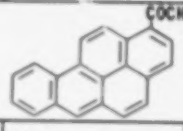
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
759.--5,9,10-TRIMETHYL-1,2-BENZANTHRACENE (Continued) 								
Hartwell and Stewart, 1942 (Continued)	23 mice 18 mice 30 mice 18 mice	C57 bl " C57 bl & dba dba & C57, black	M & F --do-- --do-- --do--	0.06% in benzene twice weekly --do-- --do-- --do--	Skin --do-- --do-- --do--	15 carc.[1] 10 carc.[2] 23 carc.[4] 16 carc.[4]	--- --- --- ---	247 days 292 days 258 days 272 days
760.--6,9,10-TRIMETHYL-1,2-BENZANTHRACENE 								
Badger et al., 1940	20 mice 10 mice	Stock Stock	--- ---	0.3% in benzene twice weekly 5 mg. in sesame oil, repeated injections	Skin Inj.	8 epi., 3 pap. 2 sarc.	--- ---	171 days 320 days
Cook et al., 1940a	Mice Mice	--- ---	--- ---	0.3% in benzene twice weekly 5 mg. in sesame oil	Skin S.C.	0[3] 0[5]	--- ---	--- ---
Badger et al., 1942	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	9 epi., 1 pap.	---	172 days
761.--3',3',9-TRIMETHYLCYCLOPENTENOPHENANTHRENE 								
Butenandt and Suranyi, 1942	10 mice --do--	BIH --do--	M & F --do--	0.4% in benzene, 1 drop twice weekly 5 mg. in sesame oil	Skin S.C.	0 0	3 alive at 1 year 1 alive at 1 year	Over 1 year --do--
762.--2,2,4-TRIMETHYL-1,2-DIHYDROFLUORANTHENE 								
Badger et al., 1942	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	9 alive at 6 mos., 2 alive at 1 year	667 days

1. Also one sarcoma and one papilloma; metastases to lymph nodes and lungs, pigmented foci.
2. Also papilloma and metastases to lymph nodes and lungs.
3. No liver lesions.
4. Also sarcoma, carcinosarcoma, papilloma and metastases to lymph nodes and lungs, pigmented foci.
5. Cholangiomatous growth.

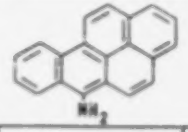
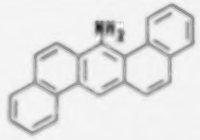
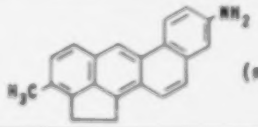
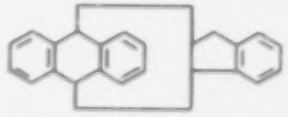
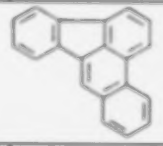
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
763.--2,3,4-TRIMETHYLFLUORANTHENE 								
Badger et al., 1942	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	8 alive at 6 mos., 6 alive at 1 year	695 days
764.--2,2,4-TRIMETHYL-1,2,3,4-TETRAHYDROFLUORANTHENE 								
Badger et al., 1942	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	7 alive at 6 mos., 5 alive at 1 year	538 days
765.--TRIPHENYLENE 								
Barry et al., 1935	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	10 alive at 6 mos., 4 alive at 1 year	548 days
Domagk, 1938	Mice	---	---	1% in water, 50 applications	Skin	0	---	10 mos.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
766.--4,10-ACE-1,2-BENZANTHRACENE 								
Morelli and Dansi, 1937	4 rats	---	---	1.75 mg. in bacon fat	Inj.	0	---	6.5 mos.
	6 rats	---	---	2.75 mg. in bacon fat	Inj.	7[1]	---	---
	10 rats	---	---	--do--[2]	Inj.	--do--	---	---
Dansi et al., 1938	9 rats	Albino	---	5 mg.[2]	Inj.	3	5 died or killed in 87 days	236 days
	4 rats	Albino	---	1.75 mg.[3]	Inj.	1[4]	---	At least 4 mos.
	8 rats	Albino	---	2.75 mg.[3]	Inj.	5[5]	3 died or killed in 87 days	236 days
Shear[6]	Mice	---	---	0.1 mg. in lard	S.C.	Tumors[7]	---	---
Shear, 1938a	7 mice	A	M	10 mg. crystals[8]	S.C.	1	1 neg. alive at 9 mos.	9 mos.
	10 mice	A	M	1 mg. in lard[8]	S.C.	2	2 neg. alive at 9 mos.	--do--
	10 mice	A	M	0.1 mg. in lard[8]	S.C.	6	3 neg. alive at 9 mos.	--do--
Shear, 1938c	Mice	Inbred	---	0.1 mg.	---	Sarc.	---	---
Dunlap and Warren, 1946	20 mice	C3H	M & F	20 mg. in tricaprylin	S.C.	6[9]	18-99 days	At least 6 mos.
767.--8,9-ACE-1,2-BENZANTHRACENE 								
Shear, 1936b	14 mice	A	---	10 mg. crystals[10]	S.C.	12[11]	2 died neg.	10 mos.
768.--ACENAPHTHANTHRACENE 								
Cook, 1932b	20 mice	Stock	---	0.5% in benzene	Skin	0	6 alive at 6 mos., 2 alive at 1 year	437 days

1. Lung metastases observed.
2. Substance not completely pure.
3. M.P. 135-136° C. Corr.
4. Tumor possibly spontaneous, with pulmonary metastases.
5. Appearing between 4-8 mos.
6. Unpublished results cited by Fieser and Campbell, 1938.
7. Average induction time 7 mos.
8. M.P. 157-158° C. Corr.
9. Average induction time 161 days.
10. M.P. 176.5-177° C. Corr.
11. First tumor in 98 days, average time of appearance 7 months. Lungs also peppered with small tumors.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
768.--ACENAPHTHANTHRACENE (Continued) 								
Kennaway[1]	Mice	---	---	---	Skin	1 epi., 2 pap.	---	---
Kennaway[2]	50 mice	---	---	---	Skin	1 epi., 2 pap.[3]	22 alive at 9 mos.	9 mos.
Badger et al., 1940	50 mice 10 mice	Stock Stock	--- ---	0.3% in benzene twice weekly 5 mg. in sesame oil, repeated injections	Skin S.C.	5 epi., 5 pap. 6 sarc.	--- ---	535 days 298 days
Cook et al., 1940a	Mice --do--	--- ---	--- ---	--- ---	Skin S.C.	0[4] --do--	--- ---	--- ---
769.--9-ACETOXY-1,2,5,6-DIBENZANTHRACENE 								
Cook, 1932b	10 mice	---	---	0.3% in benzene	Skin	0	4 alive at 465 days	465 days
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	9 alive at 6 mos., 5 alive at 1 year	678 days
770.--10-ACETOXY-1',9-METHYLENE-1,2-BENZANTHRACENE[2] 								
Dunlap and Aarren, 1940	20 mice 15 mice	Swiss C3H	M & F --do--	1.5 mgm. once in tricaprylin 2.0 mgm. once in tricaprylin	S.C. S.C.	0[5] 0[6]	18 alive at 6 mos. 11 alive at 6 mos.	At least 6 mos. --do--
771.--10-ACETYL-3,4-BENZPYRENE 								
Bindaus and Raichle, 1939	20 mice	---	---	0.5% soln. twice weekly	Skin	3 pap.[7]	---	9½ mos.

1. Unpublished results cited by Haddow 1938a.
2. Unpublished results cited by Haddow 1938b.
3. Appearing at 268 days; papillomas appeared at 255 days.
4. No liver lesions.
5. One mouse with pulmonary adenoma.
6. One with sarcoma of the shoulder at 530 days.
7. First at 5 mos.

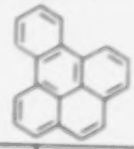
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
772.--5-AMINO-3,4-BENZPYRENE[1] 								
Windaus and Rennhak, 1937	Mice(?)	---	---	---[2]	Skin(?)	0	---	---
773.--9-AMINO-1,2,5,6-DIBENZANTHRACENE 								
Cook, 1932	10 mice	---	---	0.3% in benzene twice weekly	Skin	2 pap.	7 alive at 6 mos.	368 days
Cook, 1933a	Mice	---	---	---	Skin	Epi.	---	---
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	3 epi.	7 alive at 6 mos., 9 alive at 1 year	632 days
774.--AMINO-20-METHYLCHOLANTHRENE  (probably)								
Rossner, 1937	---	---	---	---	---	0	---	---
775.--ANTHRAINDENE 								
Hewell, 1937	Rabbits	---	---	In benzene	Skin, ear	0	---	---
776.--3,4-BENZOFLUORANTHENE 								
Domagk, 1938	Mice(?)	---	---	---	Skin painting(?)	---	---	---

1. Prepared from 5-nitro-3,4-benzpyrene.

2. M.P. 239°.

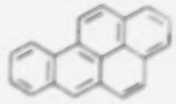
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

777.--1,2-BENZPYRENE[1]



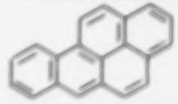
Berry et al., 1955	10 mice	Stock	---	0.3% in benzene twice weekly[2]	Skin painting	1 epi., 1 pap.	90 alive at 6 mos., 5 alive at 1 year	660 days

778.--3,4-BENZPYRENE

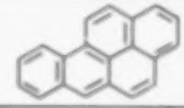


Cook et al., 1932a	Mice	---	---	---[3]	Skin	Tumors	---	---
Cook, 1933a	Mice	---	---	0.3% in benzene	Skin	Tumors[4]	---	At least 3 mos.
Cook et al., 1933	Mice	---	---	---[5]	Skin	Tumors	---	10 mos.
Cook and Hewett, 1933	10 mice	---	---	---	Skin	4 epi.[6], 1 pap.	5 died early	---
Kline and Coolen, 1934	14 rats	---	---	0.4% in lard, 0.25 cc. monthly	Inj.	6[7]	19 alive at 125 days	130 days
	8 rats	---	---	0.4% in lard, 0.25 cc. every 15 or 20 days	Inj.	--do--	--do--	--do--
	19 rats	---	---	Aqueous colloidal solution	Inj.	2	8 alive at 214 days	214 days
Kline and De Jongne, 1934	50 mice[9]	---	---	1% in benzene thrice weekly[9]	Skin	0	---	60 days
	55 mice[10]	---	---	1% in benzene thrice weekly	Skin	2	---	60 days
	55 mice[11]	---	---	--do--	--do--	2	---	60 days
	54 mice	---	---	---	---	27	---	120 days
Kline and Lidgeois, 1934	60 mice	---	---	1% in benzene, 30 applications[12]	Skin	18[13]	18 alive at 119 days	119 days
Picard and Laduron, 1934a	15 mice	---	---	0.017% colloidal aqueous soln. daily to weekly	S.C. & I.P.	0	12 alive at 2 mos.	2 mos.
	5 mice	---	---	0.25% emulsion, 1 cc. daily for 14 days	I.P. & S.C.	0	All dead in 47 days	47 days
Picard and Laduron, 1934b	15 mice	---	---	0.017% colloidal aqueous soln. daily to weekly	S.C. & I.P.	6[14]	12 alive at 2 mos.	7 mos.
	12 mice	---	---	0.25% emulsion, 1 cc. daily for 14 days	I.P. & S.C.	0	All dead in 55 days	55 days

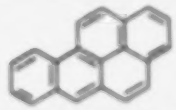
1. Named by the authors 4,5-benzpyrene. 1,2-Benzpyrene in the literature always means 3,4-benzpyrene.
2. Substance derived from coal tar; not completely purified.
3. Synthetic material and material derived from pitch used.
4. Metastasizing freely.
5. From coal tar pitch.
6. One glandular metastasis in right axilla.
7. First tumor at 25 days.
8. Animals kept in darkness.
9. Compound previously exposed to ultra violet light.
10. Animals kept in normal light.
11. Animals kept in bright light.
12. Synthetic substance used. M.P. 169-175° C.
13. First tumor at 69 days.
14. First at 52 days.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
				778.--3,4-BENZPYRENE (Continued) 				
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly[1]	Skin	4 epi., 1 pap.	3 alive at 6 mos.	206 days
	10 mice	Stock	---	---do---	---do---	3 epi.	4 alive at 6 mos., 1 alive at 1 year	368 days
	10 mice	---do---	---	---do---	---do---	5 epi., 2 pap.	2 alive at 6 mos.	221 days
	10 mice	---do---	---	---do--[2]	---do---	6 epi., 3 pap.	10 alive at 6 mos.	295 days
	10 mice	---do---	---	---do---	---do---	6 epi., 1 pap.	5 alive at 6 mos.	202 days
	10 mice	---do---	---	---do---	---do---	8 epi., 2 pap.	5 alive at 6 mos.	225 days
	10 mice	---do---	---	---do--[3]	---do---	5 epi.	9 alive at 1 year	638 days
	10 mice	---do---	---	---do---	---do---	2 epi., 1 pap.	9 alive at 6 mos., 3 alive at 1 year	503 days
Beltrami, 1935	17 mice	---	---	1% in benzene, every 2 or 3 days	Skin	0	---	---
Chahovitch et al., 1935	Mice	---	---	1% in benzene, several drops	Skin	Tumors[3]	---	---
Maisin et al., 1935	Mice	---	---	0.5% in benzene twice weekly	---do---	50 epi.[4]	72 alive at 60 days	240 days
Rondoni and Corbellini, 1935	57 mice	---	---	1% in benzene, 2 or 3 times weekly	---do---	10	Rather high mortality	147 days
Sennié et al., 1935	20 mice	---	---	1% in benzene twice weekly[5]	---do---	12 epi., 1 pap.	---	---
	10 rats	---	---	---do---	---do---	0	---	8 mos.
	8 guinea pigs	---	---	---do---	---do---	0	---	---
	5 foals	---	---	---do---	---do---	0	---	---
	10 mice	---	---	0.1% in olive oil, 0.5 cc. weekly	S.C.	7[6]	---	---
	10 mice	---	---	0.01% in olive oil, 0.5 cc. weekly	S.C.	4	---	---
	5 rats	---	---	0.1% in olive oil, 1 cc. weekly	S.C.	4	---	---
	---do---	---	---	---do---	---do---	4	---	At least 8 mos.
	9 rats	---	---	0.1% in olive oil, 0.2 to 0.3 cc.	I.T.	2	---	---
	22 mice	---	---	Crystals	S.C.	2	---	---
	12 rats	---	---	---do---	S.C.	2	---	At least 11 mos.
Schürch and Winterstein, 1935	50 mice	---	---	1% in benzene, three times weekly[7]	Skin	Pap.[8]	High mortality	Over 10 weeks

1. Synthetic substance used.
2. Substance derived from coal tar.
3. At least 4 papillomas and 12 cancers.
4. First tumor between 60 and 90 days.
5. Throughout this paper substance used melted at 176-177.5°.
6. Also one mammary tumor - possibly spontaneous.
7. From coal tar pitch.
8. First at 10 weeks.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
778.--3,4-BENZPYRENE (Continued) 								
Schürch and Winterstein, 1935 (Continued)	50 mice	---	---	1% in benzene twice weekly[5]	Skin	6 carc.[7]	6 alive at 200 days	200 days
	50 mice	---	---	0.5% in benzene twice weekly	---do---	35[3]	35 alive at 118 days	At least 118 days
	50 mice	---	---	0.1% in benzene twice weekly	---do---	15 carc.[8]	18 alive at 203 days	241 days
	50 mice	---	---	0.05% in benzene twice weekly	---do---	2 carc.[5]	---do---	242 days
	12 rabbits	---	---	0.5% in benzene twice weekly	---do---	1 carc.[7] 10 sas.	All alive at 400 days	400 days
Vassiliadis, 1935	70 mice	---	---	0.5% in benzene thrice weekly	Skin	13 epi.	---	120 days
Bisceglie, 1936a	45 mice	---	---	1% in benzene thrice weekly	---do---	Tumors[8]	Several died early	At least 190 days
Bisceglie, 1936b	8 rats	---	---	0.5% in olive oil, weekly injections	S.C.	Sarc.	---	Over 200 days
	8 rats	---	---	In benzene	Skin	Sarc.	---	---
Bisceglie, 1936c	Mice	---	---	In benzene	Skin	---do---	---	---
Clowes and Chen, 1936	Mice & rats	---	---	In sesame oil, single and repeated injections	S.C. and intracutaneous	Sarc.	---	---
Danoi et al., 1936	10 rats	Stock	---	2 mg. in lard weekly[5]	S.C.	14	4 died or killed early	235 days
	5 rats	---do---	---	---do---	S.C.	2	1 died early	197 days
	7 rats	---do---	---	2 mg. in lard weekly[9]	S.C.	6	1 died early	180 days
Domagk, 1936	5 rats	---	---	0.1% in olive oil, 0.1 cc. weekly	S.C.	2	---	33 weeks
	5 rats	---	---	0.1% in olive oil, 0.3 cc. weekly	S.C.	3	---	33 weeks
Dunning et al., 1936	486 rats	Several different	---	1% in paraffin	S.C.	348	---	201 days
	720 mice	---do---	---	---do---	S.C.	657	---	109 days
Haagensen and Orenstein, 1936	1 mouse	Marsh	♀	1% in lard, 0.2 cc.	S.C.	1	---	88 days
	4 guinea pigs	---	♂ & ♀	1% in lard, 0.5 cc.	S.C.	4	---	594 days
Krieger, 1936	10 mice	---	---	0.5% in benzene thrice weekly	Skin	4	4 alive at 291 days	364 days
	10 mice	---	---	---do---	---do---	5	5 alive at 291 days	364 days
	10 mice	---	---	0.5% in benzene weekly[10]	---do---	5	4 alive at 336 days	364 days

1. Synthetic substance used in this experiment and in remainder of paper.
2. First papilloma at 70 days.
3. Carcinomas and papillomas; first carcinomas at 10 weeks.
4. First papilloma at 17 weeks; metastases to lymph nodes.
5. First at 15 weeks.
6. M.P. 176°.
7. Carcinoma in 75% of the animals alive at 170-182 days; in one case metastases to lymph glands of neck and tracheo-bronchial region.
8. One case of metastases to lungs, tracheo-bronchial lymph glands and lymph glands.
9. M.P. 169°.
10. Impure substance used.

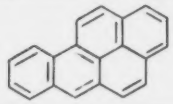
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
778.--3,4-BENZPYRENE (Continued) 								
Kluger, 1936 (Continued)	10 mice	---	---	0.9% in benzene weekly[1]	Skin	7	5 alive at 309 days	364 days
	Mice	---	---	0.5% in benzene twice weekly for 8 weeks[1]	--do--	0	---	At least 8 weeks
Iffeld, 1936	1 rat	---	---	5% in cholesterol	Liver	0	---	At least 10 mos.
	6 ferrets	---	---	--do--	Under gastric serosa	0	---	4 mos.
Lacassagne and Nyka, 1936	6 rabbits[2]	---	---	1% in benzene weekly	Skin	0	---	8 mos.
Lemaret et al., 1936a	19 rabbits	---	---	0.4% in lard, 2 cc. bimonthly	S.C.	0	---	2 years
	Rats	---	---	--do--	S.C.	Tumors[3]		
Lemaret et al., 1936b	20 mice	---	---	0.4% in lard[4]	Skin	5 pap.	---	7 mos.
	15 mice	---	---	0.4% in lard, 0.5 cc. twice monthly	S.C.	0	9 died in 21 days	5 mos.
	15 rabbits	---	---	0.4% in lard, 2 cc. twice monthly	S.C.	0	6 alive at nearly 2 years	2 years
	20 rats	---	---	0.4% in lard, 2 cc. twice monthly	S.C.	7 sarc.	7 died in 2 mos.	8 mos.
	60 rats	---	---	0.4% in lard, 1 cc. once or twice monthly	S.C.	10 sarc.[9]	20 died in 2 mos.	Over 2 mos.
Maisin and Caslen, 1936	85 mice	---	---	0.5% in benzene three times weekly	Skin	Tumors[6]	13 died early	210 days
Maisin and Fourbois, 1936	72 mice	---	---	0.5% in benzene, 1 drop 3 times weekly for 7 weeks	Skin	Tumors[7]	---	500 days
Morelli, 1936	Rats	---	---	In lard	Inj.	Sarc.	---	90 to 120 days
Oberling et al., 1936a	10 rats	---	---	Crystals	Intracerebral	4[8]	---	10 mos.
	1 rat	---	---	0.1% in oil, 1 drop	Cerebral tissue	1[8]	---	8 mos.
Oberling et al., 1936b	20 mice	---	---	1% in benzene twice weekly	Skin	10 epi.[10] 1 pap.	7 neg. died early	---
	10 mice	---	---	4 mg. (total dose) in olive oil	S.C.	7 sarc.	3 neg. died early	---
	10 mice	---	---	0.4 mg. (total dose) in olive oil	S.C.	4 sarc.	--do--	---
	10 mice	---	---	0.01% colloidal soln.	S.C.	0	---	---
	22 mice	---	---	Crystals	S.C.	3	16 neg. died early	7 mos.
	20 mice	---	---	In food	P.O.	0	16 neg. died early	16 mos.

1. Impure substance used.
2. Six animals with hypophyses destroyed by Radon.
3. 30% of the animals.
4. Substance melting at 177.-179.5° used throughout this paper.
5. First tumor at 9 months.
6. Skin cancers; also mammary tumors and papillomas
7. In 75.4% of the animals living at 60 days.
8. 3 tumors of the hypophysis and one intracranial tumor.
9. Of the hypophysis.
10. Also two beginning epitheliomas.

778.--3,4-BENZPYRENE (Continued)

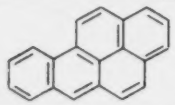
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Oberling et al., 1936b (Continued)	10 rats	---	---	1% in benzene twice weekly	Skin	0	1 neg. died early	10 mos.
	5 rats	---	---	8 mg. (total dose) in olive oil	S.C.	3	--do--	5 mos.
	5 rats	---	---	1 mg. (total dose) in olive oil	--do--	4	--do--	10 mos.
	12 rats	---	---	Crystals	S.C.	2	10 neg. died or killed	---
	10 rats	---	---	0.2 to 0.3 mg. (total dose) in olive oil	I.T.	2	1 neg. died early	5½ mos.
	5 rats	---	---	0.01% colloidal soln.	Liver	0	All dead in 8 mos.	8 mos.
	5 rats	---	---	--do--	Kidney	0	--do--	8 mos.
	20 rats	---	---	Twice weekly in food	P.O.	0	10 dead in 7 mos.	10 mos.
	8 guinea pigs	---	---	1% in benzene twice weekly	Skin	0	2 alive at 10 mos.	10 mos.
	5 fowls	---	---	--do--	--do--	1[1]	2 died early	---
	5 fowls	---	---	0.01% colloidal soln. weekly	I.V.	1[2]	All dead in 5 mos.	5 mos.
	5 fowls	---	---	0.1% in olive oil, 8 injections	I.W., breast	0	---	9 mos.
	5 fowls	---	---	0.01% colloidal soln.	Liver	0	3 alive at 10 mos.	10 mos.
Pourbaix and Denisoff, 1936	4 rabbits	---	---	1:6,000 aqueous colloidal soln., 10 cc., 21 injections	Inj.	0	---	150 days
	5 rabbits	---	---	1:6,000 aqueous colloidal soln., 10 cc., 30 injections	Inj.	0	---	215 days
	10 rabbits	---	---	0.5% in benzene, 3 times weekly	Skin	0	---	224 days
Rondoni, 1936	Mice	---	---	1% in benzene, 2 or 3 times weekly	Skin	Tumors[3]	---	At least 4 mos.
Shear, 1936a	14 mice	A	---	10 mg. crystals[4]	S.C.	6	6 died or killed early	120 days
	10 mice	A	---	--do--	S.C.	3	7 died or killed early	110 days
	6 mice	A	---	--do--	S.C.	5	1 killed early	115 days
Tanaka, 1936	Rabbits	---	---	In olive oil emulsion	I.V.	0	---	---
Tuchmann, 1936	Guinea pigs	---	W	1 mg. weekly, repeated injections	Testis	0	---	---
Tuchmann and Semay, 1936a	Rats	---	W	1 mg., 1 to 4 injections	--do--	0	---	---
Tuchmann and Semay, 1936b	--do--	---	W	1 mg., 2 injections	--do--	0	---	100 days
Waterman, 1936	6 mice	---	---	0.4% in lard daily	P.O.	5[5]	---	336 days
	12 mice	---	---	1:6,000 aqueous colloidal soln.	P.O.	0	---	---

1. Of the ovary.
2. Of the ovary; also 1 "spleno-hepatic carcinoma" and 1 reticulosis.
3. In nearly all animals surviving 4 to 6 months.
4. M.P. 17P.5-179° C. Corr.
5. Of the stomach; metastases to portal lymph nodes, etc. Also 1 papilloma of the under lip.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
778.--3,4-BENZPYRENE (Continued) 								
Askanazy, 1937	20 rats	---	---	4 mg. in tallow, repeated injections	S.C.	5[1]	8 alive at 4 mos.	6.5 mos.
	Rats	---	---	In olive oil[2]	Brain	Tumors	---	---
Bachmann et al., 1937	20 mice	Stock	---	0.3% in acetone twice weekly	Skin	2 pap.	9 alive at 122 days	122 days
Barnes and Furth, 1937	1 mouse	--	---	1 mg. in lard	Spleen	0[3]	---	7.5 mos.
	Mice	---	---	---	--do--	2[4]	---	---
Bisceglie, 1937a	45 mice	---	---	1% in benzene 3 times weekly	Skin	Tumors[5]	Several died early	At least 190 days
Bisceglie, 1937b	8 rats	---	---	0.5% in olive oil weekly, repeated injections	S.C.	Sarc.[6]	---	Over 200 days
	8 rats	---	---	--do--	S.C.	--do--	---	Over 200 days
Brunschwig et al., 1937	11 mice	Stock	---	1% in benzene 3 times weekly[7]	Skin	11[8]	---	90 days
	8 mice	Stock	---	1% in benzene 3 times weekly[9]	--do--	8[8]	---	90 days
Bullock et al., 1937	1 rat[10]	Agouti	F	2 mg. in paraffin, repeated injections	S.C.	Several[11]	---	Over 109 days
Dessy, 1937	10 rats	White	---	1 mg. in lard, repeated injections	Intramedullary (femur)	0	2 died early	50 days
Durant, 1937	15 mice	---	---	0.5% in benzene, 3 drops weekly	Skin	2[12]	8 alive at 132 days	132 days
De Gaetani and Lanza, 1937a	Mice	---	---	1% in benzene twice weekly	Skin	Some	---	---
	--do--	---	---	0.25% in oil twice monthly	S.C. or I.P.	--do--[13]	---	At least 8 mos.
	Rats	---	---	1% in benzene twice weekly	Skin	--do--[14]	---	---
	--do--	---	---	0.25% in oil twice monthly	S.C. or I.P.	--do--	---	---
De Gaetani and Lanza, 1937b	Mice	---	---	0.25% in oil, 0.3 cc. every 20 days	I.P.	1[15]	---	---
	--do--	---	---	In oil	S.C.	1[15]	---	---
De Gennaro and Di Grazia, 1937	15 mice	---	---	1% in benzene 3 times weekly	Skin	Tumors[16]	---	Over 140 days
Gilmour, 1937	15 mice	Stock	M & F	0.3% in benzene twice weekly	Skin	20 carc., 8 pap.	12 neg. alive at 25 weeks	25 weeks

1. Of the abdominal wall.
2. Plus embryonic tissue.
3. Leukemia observed.
4. One case of malignant anglo-endothelioma of the spleen and one case of reticular-celled sarcoma; also leukemia.
5. Carcinoma in 75% of the animals alive at 110 to 163 days; in one, metastases to lymph glands of the neck and tracheo-bronchial region.
6. One case of metastases to lungs, tracheo-bronchial lymph glands and lumbo-aortic lymph glands.
7. A plaque of radium salt was also applied to the site.
8. Animals with papillomas are included.
9. Metallic cautery was applied to site.
10. Bearing a cysticercus tumor and infested with taenia larvae.
11. First tumor at 109 days; also at different sites.
12. First tumor at 111 days. Also papillomas- first appearing in 81 days.
13. Also two cases of leukemic myelosis, and a subleukemic condition in one animal.
14. Also two cases of erythremic erythroblastosis.
15. Associated with myeloid leukemia.
16. Spino-cellular cancers appearing on the average of 120-140 days. Also two leukemias.

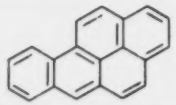
778.--3,4-BENZPYRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Oberling et al., 1936b (Continued)	10 rats	---	---	1% in benzene twice weekly	Skin	0	1 neg. died early	10 mos.
	5 rats	---	---	8 mg. (total dose) in olive oil	S.C.	3	--do--	5 mos.
	5 rats	---	---	1 mg. (total dose) in olive oil	--do--	4	--do--	10 mos.
	12 rats	---	---	Crystals	S.C.	2	10 neg. died or killed	---
	10 rats	---	---	0.2 to 0.3 mg. (total dose) in olive oil	I.T.	2	1 neg. died early	5½ mos.
	5 rats	---	---	0.01% colloidal soln.	Liver	0	All dead in 8 mos.	8 mos.
	5 rats	---	---	--do--	Kidney	0	--do--	8 mos.
	20 rats	---	---	Twice weekly in food	P.O.	0	10 dead in 7 mos.	10 mos.
	8 guinea pigs	---	---	1% in benzene twice weekly	Skin	0	2 alive at 10 mos.	10 mos.
	5 fowls	---	---	--do--	--do--	1[1]	2 died early	---
	5 fowls	---	---	0.01% colloidal soln. weekly	I.V.	1[2]	All dead in 5 mos.	5 mos.
	5 fowls	---	---	0.1% in olive oil, 8 injections	I.M., breast	0	---	9 mos.
	5 fowls	---	---	0.01% colloidal soln.	Liver	0	3 alive at 10 mos.	10 mos.
Pourbaix and Denisoff, 1936	4 rabbits	---	---	1:6,000 aqueous colloidal soln., 10 cc., 21 injections	Inj.	0	---	158 days
	5 rabbits	---	---	1:6,000 aqueous colloidal soln., 10 cc., 30 injections	Inj.	0	---	215 days
	10 rabbits	---	---	0.5% in benzene, 3 times weekly	Skin	0	---	224 days
Rondoni, 1936	Mice	---	---	1% in benzene, 2 or 3 times weekly	Skin	Tumors[3]	---	At least 4 mos.
Shear, 1936a	14 mice	A	---	10 mg. crystals[4]	S.C.	8	6 died or killed early	120 days
	10 mice	A	---	--do--	S.C.	3	7 died or killed early	110 days
	6 mice	A	---	--do--	S.C.	5	1 killed early	115 days
Tanaka, 1936	Rabbits	---	---	In olive oil emulsion	I.V.	0	---	---
Tuchmann, 1936	Guinea pigs	---	M	1 mg. weekly, repeated injections	Testis	0	---	---
Tuchmann and Demay, 1936a	Rats	---	M	1 mg., 1 to 4 injections	--do--	0	---	---
Tuchmann and Demay, 1936b	--do--	---	M	1 mg., 2 injections	--do--	0	---	100 days
Waterman, 1936	6 mice	---	---	0.4% in lard daily	P.O.	5[5]	---	336 days
	12 mice	---	---	1:6,000 aqueous colloidal soln.	P.O.	0	---	---

1. Of the ovary.
2. Of the ovary; also 1 "spleno-hepatic sarcinatisus" and 1 reticulosis.
3. In nearly all animals surviving 4 to 6 months.
4. M.P. 178.5-179° C. Corr.
5. Of the stomach; metastases to portal lymph nodes, etc. Also 1 papilloma of the under lip.

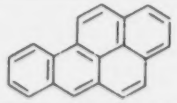
778.--3,4-BENZPYRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Gilmour, 1937 (Continued)	40 mice	Stock	M & F	0.3% in benzene twice weekly[1]	Skin	24 carc., 7 pap.	---	25 weeks
	40 mice	--do--	--do--	0.3% in benzene twice weekly	--do--	7 carc., 12 pap.	17 neg. alive at 25 weeks	--do--
	40 mice	--do--	--do--	--do--[1]	--do--	17 carc., 9 pap.[2]	6 neg. alive at 25 weeks	--do--
Di Grazia, 1937	Rats	---	---	1% in oil, 0.5 cc. weekly, repeated injections[3]	S.C.	Sarc.[4]	---	---
Haddow and Russell, 1937	30 mice	---	F	0.3% in benzene twice weekly for 15 weeks	Skin	24[5]	16 alive at 180 days	284 days
	30 mice	---	F	--do--[6]	--do--	28[5]	22 alive at 180 days	284 days
Haddow et al., 1937	9 rats	Lister	M & F	10 mg. in sesame oil	I.P.	0	---	29 days
Klinke, 1937	50 rabbits	---	---	0.5 and 1% in chloroform twice weekly	Skin	1 epi.	13 alive at 2 mos.	At least 587 days
	20 rabbits	---	---	1% salve, 2 cc. twice or 4 times monthly	I.M.	3 sarc.[7]	---	7.5 mos.
	22 rabbits	---	---	1% salve, 1.8 cc. weekly	I.M.	1[8]	---	--do--
Lacassagne and Nyka, 1937	10 rabbits[9]	---	---	1% in benzene twice weekly for 3½ mos.	Skin	Pap.[10]	---	8 mos.
Lees, 1937a	Rats	Lister	---	20 mg. in sesame oil	I.P.	0	---	65 days
Moore and Melchionna, 1937a	18 rats	---	M	5% in lard, 0.1 cc.	Prostate	14	---	---
	20 rats	---	M castr.	--do--	--do--	14	---	---
	12 rats	---	M	--do--	--do--	13[11]	---	---
	4 rats	---	M castr.	--do--[12]	--do--	4	---	148 days
Moore and Melchionna, 1937b	50 rats	---	M normal and castr.	5% in lard, 0.1 cc.	--do--	37 carc.[13]	70 to 352 days	---
	4 rats	---	M castr.	--do--[14]	--do--	4 carc.[15]	---	---
Mottram, 1937	20 mice	Inbred	---	0.5% in benzene twice weekly	Skin	5 pap.[16]	---	75 days

1. Plus twice weekly applications of 0.01% estrone in chloroform.
2. Also two mammary cancers.
3. Some animals fed on vitamin D deficient diet; others injected with vitamin D and others received no added treatment.
4. No metastases.
5. 14 tumors in 150 days.
6. Animals fed on a wheat-germ diet.
7. In one animal metastases to lungs and kidney.
8. Two other animals alive, believed to bear malignant tumors.
9. 6 with hypophysis destroyed by radon.
10. Appearing in normal animals in 4 or 5 months and in others at 8 months.
11. Apparently the number of actual tumors, not animals with tumors.
12. Received vitamin B_1 in diet.
13. Also a few sarcomas.
14. Plus daily injections of 0.25 mg of testosterone propionate.
15. Also 3 sarcomas.
16. Some malignant.

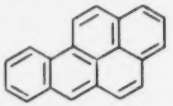
778.--3,4-BENZPYRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Mottram, 1937 (Continued)	60 mice	Inbred	---	0.5% in benzene twice weekly[1]	Skin	34 pap.[2]	---	At least 75 days
Nakahara and Fujiwara, 1937a	40 mice	---	F	0.5% in olive oil, 0.2 cc. every 2 weeks	I.P.	27 sarc.[3]	25 alive at 103 days	157 days
Nakano, 1937a	15 rats	---	---	0.5 or 1% in benzene weekly	Skin	7 pap., 4 carc.	---	150 days
	17 rats	---	---	1% in sesame oil weekly	S.C.	-10 sarc.	---	150 days
Nakano, 1937b	Mice	Stock	---	1% in benzene	Skin	Tumors[4]	---	---
	--do--	--do--	---	1% in sesame oil	S.C.	Sarc.[5]	---	At least 152 days
Nakano	Rats	---	---	In cholesterol	Liver	0	---	---
	--do--	---	---	--do--	Kidneys	0	---	---
	Rabbits	---	---	--do--	Under periosteum	0	---	---
	--do--	---	---	--do--	Bone marrow	0	---	---
	--do--	---	---	--do--	Brain	0	---	---
	Pigeon	---	---	--do--	--do--	0	---	---
	Toad	---	---	--do--	I.M.	0	---	---
Oberling et al., 1937	5 rabbits	---	---	1% in benzene twice weekly	Skin	3 epi.	3 alive at 1 year	21 mos.
	Rats	---	---	--do--	--do--	3 epi.[7]	---	At least 28 mos.
	Guinea pigs	---	---	--do--	--do--	Pap.[8]	---	Over 2 years
	5 fowls	---	---	--do--	--do--	1 epi.[9]	---	At least 2 years
	20 mice	---	---	In lard	P.O.	2 epi.[10]	3 alive at 6 mos.	At least 6 mos.
	Rats	---	---	--do--	--do--	0	---	---
	Rats	---	---	0.01% colloidal soln.	Liver	0	---	---
	Rats	---	---	--do--	Kidney	0	---	---
	Rats	---	---	In oil	Kidney	0	---	---
	4 rats	---	---	Crystals	--do--	1 carc.[11]	---	---
	5 rats	---	---	0.05 mg.	S.C.	1 sarc.	---	1.5 years
Orr, 1937	50 mice	---	---	1% in benzene weekly	Skin	Tumors	32 alive at 15 weeks	16 weeks
Regamey, 1937	90 mice	---	---	0.3% in benzene weekly	Skin	Tumors[12]	---	Ca 300 days

1. Followed by gamma radiation.
2. Some malignant.
3. First at 103 days; metastases to lungs.
4. Epitheliomas and papillomas; first papilloma at 75 days.
5. First tumor at about 85 days; metastases to lungs.
6. Unpublished results cited by Kinosita, 1937.
7. In 3 animals which died between 19-28 months.
8. Traces of papilloma.
9. Also one animal with leukemia and a tumor of the ovary.
10. Of squamous portion of stomach.
11. Metastases to peritoneum.
12. Papilloma (first at 71 days) and cancer (first at 117 days).

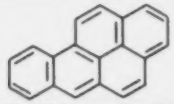
778.--3,4-BENZPYRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Rondoni, 1937	16 rats	---	---	13 mg. in lard, 3 injections	S.C.	12	4 neg. died early	---
	12 rats	---	---	--do--	S.C,	Tumors[1]	1 neg. died early	At least 2½ mos.
Rondoni and Beltrami, 1937	7 rabbits	---	---	0.5% in benzene	Skin	0	---	1 to 3 mos.
	3 rats	---	---	10 mg. in lard, 2 injections	S.C.	0	---	25 days
	2 rats	---	---	5 mg. in lard, 3 injections	--do--	0	---	3½ mos.
Sabrazès et al., 1937	Rabbits	---	---	1% in benzene, 0.2 cc. repeated injections	Radio-carpal joint	2[2]	---	At least 6½ mos.
Storti and Storti, 1937a	100 rats	---	---	1% in olive oil, 2 drops (1 mg.) weekly	Intra-medullary (femur)	7[3]	25 died in 2 mos.	11 mos.
Storti and Storti, 1937b	100 rats	---	---	1% in olive oil, ca. 8 mg. total dose	Bone marrow	7[4]	--do--	11 mos.
Storti and Storti, 1937c	100 rats	---	---	1% in olive oil, 1 mg. weekly for 8 weeks	Intra-medullary (femur)	Tumors[5]	---	7 to 10 mos.
Waterman, 1937a	6 mice	---	---	0.4% in lard	P.O.	5 carc.[6]	1 died early	336 days
	12 mice	---	---	1:6,000 aqueous colloidal soln.	P.O.	0	---	---
Waterman, 1937b	5 mice	---	---	0.4% in lard	P.O.	5[7]	---	336 days
	Mice	---	---	Aqueous colloidal soln.	P.O.	0	---	---
Wolbach, 1937	Mice	---	---	In benzene	Skin	0	---	---
Beck, S., 1938	15 mice	---	---	1 mg. in turpentine-olive oil	S.C.	5	---	380 days
	15 mice	---	---	1 mg. in "mouse lipoids"	S.C.	8	---	430 days
	20 mice	---	---	--do--	S.C.	8	---	425 days
	20 mice	---	---	--do--	S.C.	8	---	380 days
	17 mice	---	---	1 mg. in olive oil	S.C.	15	---	250 days
Bertellotti, 1938	Animals[8]	---	---	1% in benzene	S.C.	Epi. & sarc.	---	120-180 days
Bertrand and Gruner, 1938a	9 rabbits	---	---	2 to 15 mg. in lanolin, paraffin oil or vaseline oil	Intra-cerebral	0	3 died in 8 days	4.5 mos.
Bertrand and Gruner, 1938b	Rabbits	---	---	5 to 15 mg. in lanolin, paraffin oil or vaseline oil	Brain	0	---	1 year
Biscegile, 1938	Rats	--	---	1% in benzene	Skin	Tumors[9]	---	---

1. 11 nodules in 1.5 to 2.5 months.
2. Of the cubitoradial epiphyses and of the carpal bone.
3. Subcutaneous tumors arising at 7 to 10 months from refluxing of the carcinogen; in 12 other animals alterations in the hematopoietic organs noted.
4. Of the subcutaneous tissue.
5. Subcutaneous sarcoma caused by refluxing of carcinogen.
6. Of the forestomach, first at 112 days. Metastases to portal lymph node, peritoneum, liver, spleen and lungs; one papilloma of the lower lip.
7. Of the stomach; metastases to portal lymph glands, peritoneum, liver, spleen, and lungs.
8. Species not given.
9. Spino-cellular carcinoma beginning at 110 to 162 days.

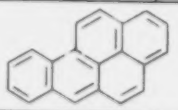
778.--3,4-BENZPYRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Bisceglie, 1938 (Continued)	Rats	---	---	0.02 g. (total dose) in olive oil, in repeated injections	S.C.	Sarc.[1]	---	---
	--do--	---	---	0.01 g. in olive oil, total dose	S.C.	Sarc.[2]	---	---
Bonser, 1938	26 mice	IF	---	0.3% in benzene weekly	Skin	26 pap.[3]	---	Not over 30 weeks
	16 mice	Kreyberg white label	---	--do--	--do--	16 pap.[3]	---	--do--
	Mice	Bagg albino	---	--do--	--do--	17 pap.[3]	Low mortality	50 weeks
	--do--	Black agouti	---	--do--	--do--	20 pap.[3]	--do--	--do--
Brock et al., 1938	Rats	---	---	Crystals in collodion sac, implanted[4]	I.P.	Sarc.	---	Over 1 year
Brunchwig and Bissell, 1938	Rats	White	---	8 mg. in petrolatum	Intra-medullary (femur)	3 sarc.[5]	5 alive at 6 mos.	10 mos.
	12 mice	---	---	Crystals	--do--	4[5]	8 alive at 4-6 mos.	At least 6 mos.
	--do--	---	---	10% in cholesterol	--do--[6]	1 sarc.	3 alive at 8 mos.	At least 9 mos.
Chahovitch and Miletitch, 1938	9 rats	---	---	0.5% in olive oil	S.C.	7	---	29-191 days
	5 rats	---	---	1% in olive oil (0.5 cc.)	--do--	5	---	178 days
	--do--	---	---	--do--	--do--	Tumors[7]	---	Ca. 3½ mos.
	--do--	---	---	--do--	--do--	--do--[8]	---	Ca. 179 days
	--do--	---	---	--do--	--do--	1 tumor[9]	---	Ca. 178 days
Cornil et al., 1938	2 rats	---	---	0.5 mg. in benzene	S.C.	0	---	30 days
Dessy, 1938	20 rabbits	White	---	1 mg. in lard, repeated injections	Intra-medullary (femur)	0	---	6 mos.
Dietrich, 1938	Mice	Stock	---	5% in benzene, repeated applications	Skin	1 pap.	---	1 mo.
	--do--	--do--	---	--do--	--do--	5 pap., 1 carc.	---	3 mos.
Domagk, 1938	180 mice	---	---	0.3% in benzene, three times weekly	Skin	30	64 died early	17 weeks
	Mice	---	---	0.5% in benzene thrice weekly	--do--	Tumors	---	---
	10 mice	---	---	0.3% in ether thrice wee	--do--	3	7 died early	17 weeks
	10 mice	---	---	0.24% in aqueous desoxycholic acid soln.	--do--	7	3 died early	--do--
	10 mice	---	---	0.5% in water, 50 applications	--do--	0	3 died early	---
Fessler, 1938	8 mice	---	---	0.3% in benzene, 3 times weekly	Skin	5 epi., 1 pap.	6 alive at 6 mos.	6 mos.
	--do--	---	---	0.3% in benzene thrice weekly	--do--	1 epi.	All alive at 6 mos.	6 mos.
	5 mice	---	---	0.5% in olive oil, 0.3 cc. every 1 to 2 weeks	S.C.	3 sarc.[10]	2 died early	4 mos.

1. In all animals surviving.
2. In 85% of animals.
3. Many became malignant.
4. Estimated dose about 1 microgram per day.
5. Of the thigh.
6. In one instance the pellet entered the tibia by mistake.
7. After 3½ months (Absence of Vitamin B).
8. After 44 days (Absence of Vitamin C).
9. Without Vitamin D.
10. Of thorax.

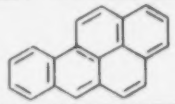
778.--3,4-BENZPYRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Flaks and Ber, 1938a	25 mice	---	M & F	0.5% in benzene, 1 drop thrice weekly[1]	Skin	3 epi., 20 pap.	---	4 mos.
Furth and Furth, 1938	7 mice	S_1[b]	---	4% in lard, 0.05 cc.	Spleen	4[2]	---	At least 21 mos.
	48 mice	Rf	---	--do--	--do--	27	---	At least 12 mos.
	11 mice	A	---	--do--	--do--	3[2]	---	At least 4 mos.
	22 mice	Af	---	--do--	--do--	8[2]	---	---
	8 mice	Ak	---	--do--	--do--	0	---	---
	102 mice	---	---	Colloidal aqueous soln. 0.4 to 0.5 cc., 1 to 2 times weekly	I.V.	15[3]	---	---
Halberstaedter, 1938	Mice	---	---	In benzene	Skin	Pap.	---	Several weeks
	55 rats	---	---	2.5 mg. in fat, repeated injections	S.C.	38 sarc.[4]	12 died neg. in 5 mos.	At least 220 days
	Hamsters(?)	---	---	---	S.C.	Tumors	---	---
Hampuri, 1938	Rats	---	---	In aqueous suspension or oily soln. in collodion sac.	I.P.	Sarc.	---	At least 12 mos.
Heiman, 1938	--do--	---	---	---	S.C.	Sarc.	---	---
Jarmai, 1938[5]	Fowls	---	---	---	Inj.	(6)	---	---
Klinke, 1938a[7]	Rabbits	---	---	1% in salve, repeated injections	I.M.	3 sarc.[8]	---	551 days
Klinke, 1938b	82 mice	---	---	1% in lard-olive oil, 0.1 cc., 1 or several injections	--do--	12[9]	---	200 days
	67 mice	---	---	1% in lard-olive oil, 0.1 cc. weekly	I.M.	26[10]	---	Over 175 days
	100 mice	---	---	--do--	I.M.	41[11]	---	220 days
	20 rats	---	---	18 mg. in lard-olive oil	I.M.	12[12]	---	201 days
	20 rats	---	---	30 mg. in lard-olive oil	I.M.	6	---	141 days
	100 rats	---	---	3 mg. in lard-olive oil, every 2 weeks	I.M.	27	---	234 days
	5 rats	---	---	2 mg. in lard-olive oil, 5 or 6 injections	I.M.	32	---	250 days
	100 rats	---	---	2 mg. in lard-olive oil, weekly for 6 weeks	I.M.	75[13]	---	220 days
Lanza, 1938a	70 rats	---	---	1% in oil, 0.15 cc. every 10 to 15 days	Intra-medullary (femur)	1 sarc.[14]	---	4-7 mos.
Lanza, 1938b	--do--	---	---	--do--	--do--	--do--	---	--do--

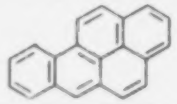
1. Other animals receiving also injections of testosterone propionate or aceto-dibromocholesterol developed fewer tumors.
2. Of these tumors, 5 were at site, 6 were of the breast, and 28 were of the lung. Leukemia was also observed.
3. Of the lungs and breast.
4. Latent period, for the most part, 140 to 150 days.
5. Unpublished results cited by Oberling and Guérin, 1940.
6. 2 with leukemia.
7. Continuation of Klinke 1937.
8. Additional; also metastases.
9. First at 96 days.
10. First at 75 days.
11. First at 100 days.
12. First at 54 days.
13. Occasional metastases to abdominal cavity, lungs and kidneys.
14. Also myeloid leukemia in 14% of the animals; anemia.

778.--3,4-BENZPYRENE (Continued)



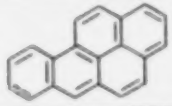
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Lanza, 1938[1 & 2]	Pigeons	---	---	In benzol soln.	Skin	Tumors[3]	---	---
	--do--	---	---	In soln. in oil	S.C.	Tumors[3]	---	---
Larionow and Soboleva, 1938	10 mice	---	M & F	19 mg. (total dose) in food during 5 mos.	P.O.	3[4]	---	At least 15.5 mos.
Leroy et al., 1938	51 rabbits	---	---	Aqueous colloidal soln.[5]	I.V., ear	0	14 alive at 51 days	82 days
Liberti, 1938	5 rabbits	---	---	0.5% in oil, 1 cc. weekly, 8 times	S.C.	0	2 died in 70 days	Ca. 4 mos.
	3 rabbits	---	---	0.5% in oil, 0.5 cc. weekly, 8 times	--do--	0	All alive at 3 mos.	Ca. 3 mos.
	10 guinea pigs	---	---	0.5% in oil, 0.5 or 1 cc. weekly, 8 times	--do--	0	All alive at 100 days	100 days
	8 rats[6]	---	---	0.5% in oil, 0.5 cc. weekly, 6 times	--do--	0	None died	4 mos.
	4 rats[7]	---	---	0.5% in oil, 0.25 cc. weekly, 5 times	--do--	0	2 died	4 mos.
Maisin et al., 1938a	100 mice	---	---	2% in benzene, 2 drops 3 times weekly for 5 weeks	Skin	Tumors[8]	---	240 days
Maisin et al., 1938b	100 mice	---	---	0.5% in benzene, 25 drops, total dose	Skin	Tumors[8]	---	240 days
	100 mice	---	---	0.5% in benzene, 20 drops, total dose	--do--	--do--[9]	---	250 days
	--do--	---	---	0.5% in benzene, 45 drops, total dose	--do--	--do--[10]	---	---
Maisin et al., 1938c	--do--	---	---	0.5% in benzene, 2 drops, 3 times weekly	--do--	--do--[11]	---	180 days
Neiman, 1938	Mice	---	---	1 mg. in sunflower-seed oil, 3 injections	S.C.	Tumors	---	At least 3.5 mos.
Nicod and Regamey, 1938	--do--	---	M	0.3% in benzene	Skin	19 epi.,[12] 55 pap.[12]	87 alive at 65 days	Over 118 days
Noble, 1938a	5 rats	Wistar	M	10 mg. crystals	S.C. abdominal wall	0	---	28 days
	3 rats	--do--	M	50 mg. crystals		0	---	--do--
Orr, 1938	Mice	Stock	---	0.3% in benzene weekly	Skin	Tumors	---	At least 21 weeks
	Mice	Stock	---	1% in benzene weekly	Skin	Tumors	---	At least 6 weeks
	10 mice	Stock	---	0.3% in acetone weekly	--d --	--do--	---	18 weeks
Orr and Polson, 1938	1 rabbit	---	F	50 mg. per kg. body weight in oily suspension	I.P.	1[13]	---	4 days

1. Cited by Liberti, 1938.
2. Reported by Lanza to the Societa Medico-chirurgica di Catania.
3. Spino-cellular epithelial.
4. Two females with multiple papillomas of the stomach; first at 11.5 months; one male with beginning cancer. All three had also lung adenomas and one a breast adenocarcinoma.
5. Commercial product used.
6. Mus decumanus.
7. Mus rattus.
8. Cancer in 38.3% of animals living at 60 days.
9. Cancer in 18% of animals living at 60 days.
10. Cancer in 23.2% of animals living at 60 days.
11. Cancer in 85.2% of animals living at 60 days.
12. First epithelioma at 118 days; first papilloma at 65 days.
13. Multiple tumors of the uterus, possibly malignant.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
778.--3,4-BENZPYRENE (Continued) 								
Peacock and Beck, 1938	10 mice	---	---	0.5 mg. crystals	S.C.	2	---	320 days
	10 mice	---	---	0.75 mg. crystals	S.C.	2	---	---
	20 mice	---	---	0.3 mg. in ether	--do--	0	---	190 days
	8 mice	---	---	1 mg. in mouse fat	--do--	1	---	240 days
	17 mice	---	---	1 mg. in olive oil	--do--	15	---	240 days
	13 mice	---	---	1 mg. in olive oil--paraffin	--do--	11	---	275 days
	20 mice	---	---	1 mg. in mouse lipoids	--do--	8	---	375 days
Perry, 1938	4 mice	---	F	31 mg. in lard	S.C.	2	2 died neg. in 2.5 mos.	2.5 mos.
	20 mice	---	F castr.	4 mg. in lard	S.C.	0	---	---
Piemonte, 1938	20 mice	---	---	0.5% in benzene, ca. twice weekly	Skin	1	21 alive at end of exper.	Over 15 weeks
	32 mice	---	---	--do--	--do--	3	17 alive at end of exper.	Over 12 weeks
Pikovski and Doljanski, 1938	9 fowls	---	F	Repeated injections	Intra-medullary	0[1]	2 died early, 4 alive at 1 year	At least 1 year
Sabrazès et al., 1938	Rabbits	---	---	0.1% in benzene, 0.2 cc.	Knee joint	0	---	---
Serono and Montezemolo, 1938	Rats	Albino	M	0.2 cc. (10 mg. total dose) in almond oil, 5 injections	Inj.	Tumors[2]	37% died of poisoning	254 days
	--do--	--do--	M	0.2 cc. (10 mg. total dose) in almond oil plus bioplastin, 5 injections	Inj.	Tumors[3]	1 alive at 254 days	254 days
Shear, 1938a	24 rats	---	---	5 mg. crystals	S.C.	17	---	Less than 13 mos.
	23 guinea pigs	---	---	--do--	--do--	2[4]	19 alive at 20 mos.	20 mos.
Tanaka, 1938	Rats	---	---	---	S.C.	Sarc.	---	---
Taussig et al., 1938	50 mice	Rockland all-purpose	F	0.5% in benzene, 1 drop twice weekly[5]	Skin	23 epi.	41 alive at 5 mos.	6 mos.
	50 mice	--do--	F	--do--[5,6]	--do--	6 epi.	25 alive at 1 mo.	6 mos.
	--do--	--do--	F	--do--[7]	--do--	17 epi.	39 alive at 5 mos.	6 mos.
Tchakhotine, 1938	Mice	---	---	Repeated applications	Skin	Tumors	---	At least 2 mos.
	--do--	---	---	In oil or benzene, repeated injections	S.C.	--do--	---	---

1. 3 leukemias.
2. 63% had tumors in 112-139 days.
4. First tumor at 14 months.
5. Animals also exposed to sun lamp.
6. Animals also injected with hematoporphyrin.
7. Animals kept in darkness.

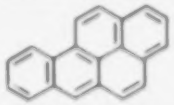
778.--3,4-BENZPYRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Tchakhotine and Pomriaskinsky-Kobozieff, 1958	Mice	---	---	25 to 500 micrograms in oil or benzene twice weekly	S.C.	Tumors	---	At least 2 mos.
	--do--	---	---	25 micrograms in benzene twice weekly	Skin	--do--	---	At least 2 mos.
Velade, 1958	10 rats	---	---	1 mg. in oil	S.C.	5	---	6 mos.
	10 rats	---	---	2 mg. in oil	S.C.	8	---	6 mos.
	10 rats	---	---	5 mg. in oil	S.C.	10	---	--do--
	6 dogs	---	---	2 mg. in oil, 3 injections	S.C.	0	---	Over 6 mos.
	1 rabbit	---	F	2 mg. in oil	Mammary tissue	0	---	---
	6 rabbits	---	---	1 and 2 mg. in oil	Liver	0	---	4 mos.
Woglom, 1958	497 rats	---	---	0.26 to 0.52 mg. on thread 0.36 to 0.72 mg. on thread 0.54 to 0.68 mg. on thread 0.06 to 0.12 mg. on thread	(Kidney) Testis) Uterus) (Liver)	29	381 alive at 157 days	630 days
	55 mice	---	---	On thread	Different organs	19	---	---
Zondek, 1958a[1]								
Baumann et al., 1959	100 mice	♀	---	1% in corn oil, 0.05 cc.[2]	S.C.	Tumors[3]	---	8 mos.
	100 mice	♀	---	0.3 to 0.5% in benzene twice weekly[2]	Skin	--do--[4]	---	5.5 mos.
Benecke and Schröder, 1959	25 rats	---	---	1 mg. in olive oil[5]	Salivary gland	2 sarc.	31 died in 6 mos.	9 mos.
	5 rats	---	---	8 to 40 mg. in olive oil	--do--	--do--	--do--	--do--
	25 rats	---	---	2 mg. in olive oil	--do--	--do--	--do--	--do--
	5 mice	---	---	0.5 mg. in olive oil	--do--	--do--	--do--	--do--
	30 mice	---	---	1 mg. in olive oil	--do--	4 sarc.	---	9 mos.
	20 mice	---	---	--do--	--do--	--do--	---	9 mos.
Bertellotti, 1959	25 mice	---	---	1% in benzene, 5 times weekly[6]	Skin	8 epi., 2 sarc.	Ca. 7% mortality	160 days
Brock et al., 1959	Rats	---	---	Crystals suspended in saline in collodion sac.[7]	I.P.	Tumors	---	Over 1 year
Cottini and Mazzoni, 1959	26 human beings[8]	---	M & F	1% in benzene (occasionally olive oil), daily	--do--	0	---	4 mos.
Demole, 1959	10 mice	---	M	1% in benzene, three times weekly	Skin	10 pap.	---	8 weeks
Druckrey et al., 1959	Rats	---	---	10 mg. in oil	S.C.	Sarc.[9]	---	Over 4 mos.

1. See under Estradiol benzoate.
2. Different diets used.
3. In 50 to 75 of the "effective total" of animals. See Baumann and Rusch, 1959.
4. 56 to 94% of the "effective total" of animals
5. 12 animals received second doses.
6. The simultaneous injection in other animals of arsenobenzene had a negligible effect on tumor production.
7. Estimated dose about 1 microgram per day per animal.
8. All afflicted with more or less serious disorders.
9. First tumor at about 4 months; no metastases.

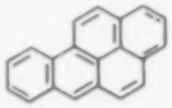
778.--3,4-BENZPYRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Duran-Reynals, 1951	11 frogs	Rana pipiens	---	2 mg. in lard	I.M.	0	All died in 20 days	20 days
Geschickter, 1959	8 rats	---	M & F	2.6-5.0 mg. pellets	Mammary gland	Tumors[1]	---	At least 335 days
Giuffrida, 1959	20 mice	---	Normal & castr.	1% in benzene, 2 drops every 2 days	Skin	Tumors[2]	---	6 mos.
Gummel and Harai, 1959	Rabbits	---	---	1.8 mg. per kg. body weight in aqueous sodium cholesterone sulfonate soln., repeated injections	Inj.	0	---	4-6 weeks
Gye and Foulds, 1959	2 hamsters	---	M	0.4% in lard, 0.2 cc. weekly, repeated injections	S.C.	2[3]	---	13 weeks
Halberstaedter, 1959a	Rats	---	---	0.25 mg. in lard twice monthly	S.C.	49[4]	53 alive at 5 mos.	At least 200 days
	25 hamsters	---	---	in lard	S.C. (?)	19[5]	---	At least 4.5 mos.
Halberstaedter, 1959b	40 hamsters	---	---	1% soln., 0.25 cc.	S.C.	37[6]	---	Over 3 mos.
Koch et al., 1959	6 newts[7]	---	M & F	In olive oil, repeated injections	S.C.	5[8]	---	108 days
Korteweg and Thomas, 1959	24 mice	F_1 hybrid	---	0.5% in benzene, 2 drops twice weekly	Skin	24 carc.	---	190 days
	22 mice[9]	--do--	---	--do--	--do--	10 carc., 4 pap.	8 died neg.	190 days
	8 mice	--do--	---	0.5% in benzene, three times weekly	--do--	8 carc.	---	300 days
	8 mice[9]	--do--	---	--do--	--do--	1 carc., 1 pap.	---	--do--
Larionov, 1959	Mice	---	---	0.5% in benzene	Skin	Pap., carc.	---	4 mos.
	Rabbits	---	---	--do--	--do--	0	---	At least 7 mos.
Leinati, 1959	30 mice	---	---	1% in olive oil, repeated applications	Skin[10]	24 pap.[11]	6 died early	---

1. Fibrosarcomas, between 260 and 535 days.
2. Simultaneous treatment with estrone, prolan, testosterone, cholesterol and lecithin hastened tumor development.
3. Metastases to lungs.
4. Latent period for the most part 140 to 150 days.
5. Latent period 2.5 to 4.5 months.
6. Latent period for the most part 140 to 150 days.
7. Triton cristatus, and triton taeniatus.
8. Metastases to lungs and heart.
9. Hypophysectomized.
10. On site of cicatrices produced by thermocautery.
11. Many developed into cancer. Also subcutaneous tumors.

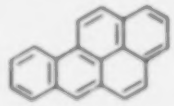
778.--3,4-BENZPYRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Liberti, 1959	24 rabbits	---	---	0.5% in olive oil, ca. 1 cc.	Gall bladder	Pap.	---	1 to 7 mos.
Maisin et al., 1959a	100 mice	---	---	0.5% in benzene, 2 drops thrice weekly	Skin	Tumors[1]	50 died neg. in 50 days	140 days
	100 mice	---	---	--do--[2]	--do--	--do--[3]	40 died neg. in 50 days	--do--
	--do--	---	---	--do--[4]	--do--	--do--[5]	61 died neg. in 60 days	--do--
	--do--	---	---	--do--[6]	--do--	--do--[7]	65 died neg. in 60 days	140 days
Maisin et al., 1959b	100 mice	---	---	0.5% in benzene, 2 drops thrice weekly	--do--	--do--[7]	35 alive at 120 days	120 days
Maisin et al., 1959d	100 mice	---	M & F	--do--	--do--	--do--[9]	---	300 days
	100 mice	---	M & F	--do--[8]	--do--	--do--[10]	---	--do--
	100 mice	---	M & F	--do--[11]	--do--	--do--[7]	---	--do--
Maisin et al., 1959e	100 mice	---	---	0.5% in benzene, 1 drop thrice weekly	--do--	--do--[12]	28 alive at 180 days	180 days
May and Litzka, 1959	88 rats	---	---	0.1% in olive oil, 0.3 cc.	S.C.	78	---	126 to 180 days
	39 mice	Little's dilute brown	---	0.5% in ether, thrice weekly	Skin	17	---	14 to 22 weeks
Morton and Nider, 1959	50 mice	C57	---	0.25 mg. in sesame oil	S.C.	36	10 neg. died or killed	32 weeks
	50 mice	--do--	---	0.25 mg. in colloidal aqueous soln.	S.C.	23	23 neg. died or killed	32 weeks
	50 mice	--do--	---	0.25 mg. in mouse fat	S.C.	1	43 neg. died or killed	--do--
Nakano[13]	17 rats	---	---	1 mg. in olive oil, every 7-10 days	Inj.	15 sarc.	---	121 days
	5 rats	---	---	1 mg. in bran oil, every 7-10 days	Inj.	3 sarc.	---	123 days
	14 mice	---	---	1% in sesame oil, 0.025 cc. every 7-10 days	Inj.	11 sarc.	---	140 days
	17 mice	---	---	0.5% in sesame oil, 0.025 cc. every 7-10 days	Inj.	5 sarc.	---	70 days
Noble, 1959b	5 rats	Wistar	M	10 mg. crystals	S.C.	0	---	4 weeks
Nonaka, 1959	Rats	---	---	1% in sesame oil, 0.05 cc. weekly	Uterus and mammary gland	[14]	9 alive at 100 days	At least 260 days
	Mice	---	---	--do--	Mammary gland	5 sarc.[15]	--do--	At least 217 days

1. Cancer in 54% of animals living at time of appearance of first tumors.
2. Received vitamin B_2 in diet.
3. Cancer in 51% of animals living at time of appearance of first tumor.
4. Received vitamin B_1 in diet.
5. Cancer in 44% of animals living at time of appearance of first tumor.
6. Received vitamin B_6 in diet.
7. Cancer in 55% of animals living at time of appearance of first tumor.
8. Plus 0.9 gm. testosterone propionate S.C.
9. Cancer in 41% of animals living at time of appearance of first tumor.
10. Cancer in 46% of animals living at time of appearance of first tumors.
11. Plus 0.09 gm. testosterone propionate S.C.
12. Cancer in 58% of animals living at time of appearance of first tumors.
13. Unpublished results cited by Kinosita, 1959.
14. Of the uterus at 26 days. Other animals which received also injections of estrone benzoate developed tumors earlier.
15. At 155 to 217 days. Other animals which received other injections of estrone benzoate developed tumors earlier.

778.--3,4-BENZPYRENE (Continued)

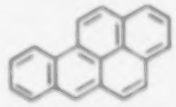


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Oberling et al., 1939a	10 rats	---	---	0.05 mg. in olive oil	S.C.	1	3 died early	10 mos.
	35 rats	---	---	0.1 mg. in olive oil	--do--	4	4 died early	15 mos.
	20 rats	---	---	0.5 mg. in olive oil	--do--	9	3 died early	19 mos.
	75 rats	---	---	1 mg. in olive oil	--do--	64[1]	6 died early	12.5 mos.
	10 rats	---	---	1 mg. in rat fat	--do--	--do--	--do--	--do--
	20 rats	---	---	21 mg. in olive oil	S.C.	18[1]	1 died early	10 mos.
	10 rats	---	---	25 mg. in lard	--do--	17[1]	3 died early	10.5 mos.
	10 rats	---	---	25 mg. in rat fat	--do--	--do--	--do--	--do--
	16 rats	---	---	25 mg. in rat fat, 5 injections	--do--	6[1]	10 died early	6 mos.
Oberling et al., 1939b	10 rats	---	---	Fragment of melted solid	Liver	2	2 died of infection	26 mos.
Oberling et al., 1939c	10 rats	---	---	2.5% in rat fat, 1 cc.	S.C.	8	2 died early	7 mos.
	10 rats	---	---	2.5% in lard, 1 cc.	--do--	9	1 died early	10.5 mos.
	20 rats	---	---	2.1% in olive oil, 1 cc.	--do--	18	--do--	6.5 mos.
	10 rats	---	---	0.1% in rat fat, 1 cc.	--do--	5	2 died early	10.5 mos.
	15 rats	---	---	0.1% in olive oil, 1 cc.	--do--	11	1 died early	11.5 mos.
Oberling et al., 1939d	10 guin. pigs	---	---	0.1% in oil	Intra-cerebral	0	19 alive at 1 year	Over 1 year
	10 fowls	---	---	--do--	--do--	0	--do--	--do--
	20 rabbits	---	---	--do--	--do--	0	--do--	--do--
	65 rats	---	---	0.1% in oil, 0.1 cc.	--do--	6	---	At least 2 years
	20 rats	---	---	Small crystals[2]	--do--	4[3]	---	31 mos.
	10 rats	---	---	0.1% in oil[4]	--do--	1[4]	---	---
	10 rats	---	---	0.1% in oil	--do--	0	---	1 year
	10 rats	---	---	Small crystals[5]	--do--	0	---	--do--
Orr, 1939	50 mice	---	M & F	5 mg. in solid paraffin[6]	S.C.	4 sarc.[7]	Majority killed for histological purposes	387 days
	50 mice	---	--do--	--do--[8]	S.C.	--do--	--do--	--do--
Narat and Gummel, 1939	50 rats	---	---	1.25 mg. in aqueous sodium cholestenone sulfonate soln., daily	P.O.	0	---	32 weeks
Rondoni and Beltrami, 1939	6 rats	---	---	5 mg. in lard, 5 injections	S.C.	6	---	4 mos.
	7 rats	---	---	--do--	S.C.	7	---	Nearly 6 mos.
Rothbard and Herman, 1939	6 fowls	R.I. Red & Barred Rock	---	10 mg. plus 5 mg. in lard	I.M.	4[9]	---	10 mos.
Roussy et al., 1939	Rats	---	M	1% in oil[5]	Intra-cerebral	3[10]	---	At least 24.5 mos.

1. With metastases.
2. M.P. 179°.
3. One tumor of the hypophysis and 3 sarcomas.
4. Of the hypophysis probably spontaneous.
5. M.P. 174-176°.
6. A pyrene pellet was introduced S.C. at another site.
7. For histology of these tumors see Bonser and Orr, 1939.
8. A 1,2-benzanthracene pellet was introduced S.C. at another site.
9. Arising within 5 months.
10. Spindle-cell sarcoma.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

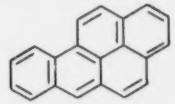
778.--3,4-BENZPYRENE (Continued)



Roussy et al., 1939 (Continued)	Rats	---	F	Crystals[1]	Intra-cerebral	4[2]	---	At least 25 mos.
	Rabbits	---	---	---	--do--	0	---	---
	Fowls	---	---	---	--do--	0	---	---
Scherer[3]	70 rats	White	---	1% in lard, 0.1 cc.[4]	Brain	0	27 alive at 200 days	300 days
Schürch, 1939a	Rabbits	---	---	0.5% in benzene, 3 times weekly	Skin	1[5]	---	3.5 years
Schürch, 1939b	20 rabbits	---	---	0.5% soln. (in benzene ?) 3 times weekly	--do--	11 carc.[6]	2 died in 5 mos.	3.5 years
Steiner, 1939	Rats	---	---	---	Sub-maxillary glands	Tumors[7]	---	---
Tsuru and Tsuru, 1939	100 mice	---	---	0.2% in chloroform	Skin	27	High mort.	40 weeks
	--do--	---	---	0.1% in chloroform	--do--	22	--do--	--do--
	--do--	---	---	0.05% in chloroform	--do--	19	--do--	--do--
	--do--	---	---	0.025% in chloroform	--do--	12	--do--	--do--
	Mice	---	---	In oleic acid	--do--	Tumors[8]	---	---
d'Agata, 1940	Rats	White	---	0.5 cc., 50% in olive oil, weekly for 6 weeks	S.C.	Tumors	---	Ca. 210 days
Alvasian, 1940	80 mice	---	---	0.5% in benzene, 1 drop every 3 days for 4 mos.	Skin	Pap. & epi.	---	Over 4 mos.
Andervont and Shimkin, 1940	1/2 mice	A	---	0.25 mg. in aq. susp.	I.V.	8[9]	---	20 weeks
	--do--	A	M & F	0.5 mg. in tricaprylin	S.C.	5 sarc.[10]	---	14 weeks
Baumann et al., 1940	80 mice[11]	---	---	0.5% in benzene, 1 drop twice weekly	Skin	35 epi.[12]	62 alive at 3-1/2 mos.	5 mos.
Beck, S., 1940	110 mice	Stock	---	1 mg. in olive oil[13]	I.P.	26 sarc.[14]	86 alive at 6 mos. 39 alive at 1 year	At least 1 year
Beck, S. and Peacock, P. R., 1940	16 mice	Stock	---	0.5% in benzene twice weekly for 1 month	Skin	0	---	Ca. 610 days
	17 mice	--do--	---	0.5% in benzene twice weekly for 2 months	--do--	5 epi., 1 pap.[15]	---	Ca. 360 days
	20 mice	--do--	---	0.5% in benzene twice weekly for 3 months	--do--	13 epi., 5 pap.	---	Ca. 275 days
	19 mice	--do--	---	0.5% in benzene twice weekly during alternate mos. for 6 mos.	--do--	5 epi., 4 pap.	---	Ca. 310 days

1. M.P. 179°.
2. 3 spindle-cell sarcomas and one definite astrocytoma.
3. Unpublished results cited by Seligman et al., 1939.
4. 50 animals received repeated injections.
5. Melanoma.
6. First tumor at 15 months; first papilloma at 6 months.
7. Squamous cell carcinoma, carcinosarcoma, epidermoid cysts.
8. Regarded as twice as potent as dibenzanthracene in oleic acid and 5 times as potent as dibenzanthracene in chloroform.
9. Of the lungs; first within 8 weeks.
10. Also 6 animals with lung tumors.
11. Other mice also received applications of cholesterol on a high fat diet.
12. First at 3.5 months.
13. Many given also cautery, X-radiation, U. V. light, skin paintings with benzpyrene in benzene, to test general susceptibility to cancer.
14. Between 4 and 8 months.
15. Also lung tumors.

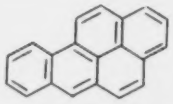
778.--3,4-BENZPYRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Beçk, S. and Peacock, P. R., 1940 (Continued)	19 mice	Stock	---	0.3% in benzene twice weekly for 3 mos. separated by 2-monthly intervals	Skin	5 epi., 4 pap.	---	Ca. 440 days
	9 mice	--do--	---	0.3% in benzene every 8 days for 6 mos.	--do--	7 epi., 1 pap.	---	Ca. 300 days
	19 mice	--do--	---	0.3% in benzene twice weekly for 3 mos. separated by 3-monthly intervals	--do--	6 epi., 3 pap.	---	Ca. 400 days
Beltrami, 1940	50 mice	---	---	0.5% in benzene, 1 drop every 3 days[1]	Skin	Tumors	19 died in 4 mos.	4 mos.
Bessemans and Maisin, 1940/41	50 mice	White	---	2 drops tri-weekly	Skin	15 pap. & 1 cancer	34 alive at 60 days	60 days
	--do--	--do--	---	--do--	Skin	29 pap. & 6 cancer	32 alive at 90 days	90 days
	--do--	--do--	---	--do--	Skin	29 pap. & 9 cancer	28 alive at 120 days	120 days
	30 mice	--do--	---	--do--	--do--	16 pap.	19 alive at 60 days	120 days
	30 mice	White	---	2 drops tri-weekly	Skin	11 pap.	4 alive at 120 days	120 days
	20 mice	--do--	---	--do--	--do--	6 pap.	13 alive at 70 days	120 days
Bisceglie, 1940	75 rats	---	---	1% in benzene	Inj.	0[2]	15 dead in 70 days	At least 5 mos.
Bonser and Wainman, 1940	Mice	IF	M & F	0.3% in benzene weekly	Skin	17 pap.[3]	26 alive at 8 weeks	16 weeks
	--do--	--do--	--do--	--do--[4]	--do--	33 pap.[6]	34 alive at 8 weeks	--do--
Brunschwig et al., 1940	59 rabbits[5]	---	---	0.3% in benzene thrice weekly	Skin, ear	6 carc.[7]	---	610 days
Burr et al., 1940	15 mice	CBA	---	0.5% in benzene twice weekly	Skin	Tumors[8]	---	26 weeks
Cabot et al., 1940	20 mice	Market	F	0.2% in benzene thrice weekly	Skin	19[9]	---	At least 22 weeks
	20 mice	--do--	F	0.05% in benzene thrice weekly	--do--	16[10]	---	At least 25 weeks
Chalmers, 1940	21 rats	---	---	0.03% colloidal soln., 2-3 cc. every other day	I.V., tail	0	11 alive at 10 mos.	18 mos.
Crabtree, 1940a	40 mice	---	---	0.3% in ether plus 2% liquid paraffin twice weekly	Skin	39 pap.[11]	---	24 weeks

1. Other animals received also pyocyanine, developed tumors in shorter time.
2. 11 cases of leukemia.
3. Appearing at 9-15 weeks; 16 animals developed carcinoma.
4. Animals also fed liver.
5. Some injected with extracts of human warts, human gastric juices from cancerous stomachs, etc.
6. Appearing at 8-13 weeks; 27 animals developed carcinoma.
7. Many papillomas, first carcinoma at 272 days.
8. First papilloma at 18 weeks; first epithelioma at about 23 weeks.
9. At 22 weeks.
10. No tumors observed in 22 weeks.
11. First at 8 weeks; average induction time 12.1 weeks.

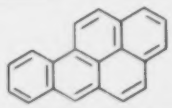
778.--3,4-BENZPYRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Crabtree, 1940a (Continued)	40 mice	---	---	0.3% in ether twice weekly	Skin	38 pap.[1]	---	24 weeks
	--do--	---	---	0.3% in benzene plus 2% liquid paraffin, twice weekly	--do--	40 pap.[2]	---	--do--
	--do--	---	---	0.3% in benzene twice weekly	--do--	37 pap.[3]	---	--do--
Crabtree, 1940b	40 mice	Stock	---	0.3% in ether plus 2% liquid paraffin twice weekly	--do--	35	35 alive at 18 weeks	18 weeks
Dittmar, 1940	46 mice	Strain A	---	---	S.C.	Tumors[4]	---	2-5 mos.
	40 mice	A	---	---	Skin	35[5]	---	2-6½ mos.
	26 mice	K	---	---	--do--	17[6]	---	--do--
	46 mice	A	---	---	S.C.	32 sarc.	---	--do--
	40 mice	K	---	---	--do--	21 sarc.	---	--do--
	30 mice	F	---	---	--do--	21 sarc.	---	--do--
	40 mice	A	---	---	Skin	35[7]	---	2-6 mos.
	46 mice	A	---	---	S.C.	30 sarc.	---	2-5 mos.
	40 mice	A	---	---	Skin	Tumors	---	2-6 mos.
Doniach and Mottram, 1940	60 mice[8]	Stock	M & F	0.5% in benzene twice weekly for 100 days[9]	Skin	18 cancers, 14 pap.	---	250 days
	15 mice[10]	Inbred albino	---	0.5% in benzene twice weekly for 140 days[11]	Skin	5 cancers, 9 pap.	---	--do--
	50 mice[12]	Stock	M & F	0.5% in benzene twice weekly for 100 days[11]	--do--	1 cancer, 10 pap.	---	200 days
	50 mice[12]	Stock	M & F	--do--[9]	--do--	12 pap., 1 cancer	---	200 days
	30 mice[10]	Stock	M & F	0.5% in benzene twice weekly for 100 days[11]	--do--	13 cancers, 8 pap.	---	200 days
	30 mice[10]	--do--	--do--	0.5% in benzene twice weekly for 100 days[9]	--do--	15 cancers, 10 pap.	---	200 days
Dunning and Curtis, 1940	2278 rats	Axc, Sherman, silver gray, Marshall, & misc.	---	0.2 to 4.0 mg. in paraffin	S.C. 1-6 sites	1369	2018 alive at 60 days	---
Friedrich-Freksa, 1940	51 mice	---	---	50 micrograms in benzene[13]	Skin	6[14]	---	Ca. 1-3 mos.
Halberstaedter, 1940	40 hamsters	---	---	In lard every 3 or 4 weeks	S.C.	29[15]	9 died in 3 mos.	---

1. First at 10 weeks; average induction time 14.3 weeks.
2. First at 11 weeks; average induction time 14.9 weeks.
3. First at 8 weeks; average induction time 12.1 weeks.
4. Higher per cent than in controls.
5. 20 carcinomas.
6. 11 carcinomas.
7. 19 carcinomas.
8. Divided into groups designed to show effect of light.
9. Very dark color and impure.
10. Animals kept in dark.
11. Purified in dark.
12. Animals exposed to naked sunlight.
13. 8 received twice weekly 50 micrograms, 20 times.
14. Pavement cell carcinomas.
15. First at 2 mos.; average 3 mos.

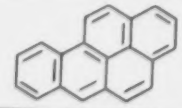
778.--3,4-BENZPYRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Hoch-Ligeti, 1940	3 rabbits	---	---	0.05% in aqueous gelatine soln., 5 cc. every 1 to 3 weeks	S.C.	0	2 died in 1 mo.	300 days
Howe et al., 1940	13 rats[1]	Wistar & hooded	---	5% in cholesterol[2]	S.C.	8 sarc.	---	15 mos.
	13 rats[3]	--do--	---	--do--	S.C.	0	High mortality	---
	7 rats[4]	Wistar	---	--do--	S.C.	4 sarc.	---	8 mos.
	8 rats[4]	--do--	---	--do--	--do--	--do--	---	7½ mos.
	12 rats[1]	Market	---	--do--	--do--	7 sarc.	---	9 mos.
	12 rats[4]	--do--	---	--do--	--do--	10 sarc.	---	9½ mos.
	12 rats[1]	--do--	---	5 mg. crystals	--do--	7 sarc.	10 alive at 4½ mos.	9 mos.
	12 rats[4]	--do--	---	--do--	--do--	10 sarc.	All alive at 4½ mos.	9½ mos.
Jacobi and Baumann, 1940	86 mice[5]	C or albino	---	0.3% soln. twice weekly[6]	Skin	Tumors[7]	---	At least 9 mos.
	96 mice[5]	--do--	---	0.3% soln. twice weekly[9]	Skin	Tumors[8]	---	--do--
Korosteleva and Shabad, 1940	26 guinea pigs	---	---	1% in olive oil, two injections, 1 month apart	S.C.	0	---	At least 30 days
	20 guinea pigs	---	---	0.5% and 0.25% in oil, repeated injections	S.C.	0	---	--do--
Larionow, 1940	20-37 mice	---	---	0.5% 1 drop every 3 days	Skin	epi. & pap.[10]	---	Over 3 mos.
Leuchtenberger, 1940	869 mice	Rockland	F	Single injection	S.C.	0[11]	---	---
des Ligneris, 1940	50 rats	---	---	0.5-10.0 mg. in cholesterol pellets	I.P.	Sarc.	---	24 mos.
	--do--	---	---	1% in lard, 0.5-2.5 cc.	--do--	--do--	---	--do--
	--do--	---	---	--do--	S.C.	--do--	---	27 mos.
	50 mice	---	---	0.25-1.0 mg. in cholesterol pellets	I.P.	Sarc.	---	7 mos.
	--do--	---	---	0.5% in lard, 0.25-0.50 cc.	I.P.	--do--	---	7 mos.
	100 mice	---	---	--do--	S.C.	--do--	---	8 mos.
	50 mice	---	---	0.3% soln., 2 and 3 times weekly	Skin	31 epi., 16 pap.	43 alive at 3 mos.	6 mos.
	50 mice	---	---	0.3% soln., 3 times weekly for 3 mos.	Skin	25 epi., 14 pap.	40 alive at 3 mos.	--do--
Maisin, 1940	100 mice	---	---	0.5% in benzene, 2 drops 3 times weekly for 7 weeks	Skin	54.3% epi[12]	46 alive at 60 days	140 days
	--do--	---	---	--do--[13]	--do--	43.6% epi.	38 alive at 70 days	--do--

1. On vitamin A diet.
2. Pellets weighed 3½-55½ mg.
3. On very low vitamin A diet.
4. On low vitamin A diet.
5. Effective total.
6. Animals fed different fats.
7. Half of the animals had tumors in 4-5 mos.
8. Half of the animals had tumors in 5-6 mos.
9. Other animals fed on stock diet and with liver oils applied to skin, or animals on a fat diet and skin painted with ether, gave similar results as those on fat diet.
10. In nearly all animals in 3 months.
11. Visceral changes, in addition to those described by other investigators, reported.
12. Of the number alive at appearance of first cancer (throughout experiment).
13. Received also Vitamin B_1.

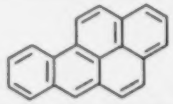
778.--3,4-BENZPYRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Maisin, 1940 (Continued)	100 mice	---	---	0.5% in benzene, 2 drops 3 times weekly for 7 weeks[1]	Skin	54.2% epi.	35 alive at 70 days	140 days
	--do--	---	---	--do--[2]	--do--	50.6% epi.	73 alive at 60 days	180 days
	--do--	---	---	--do--[3]	--do--	54% epi.	61 alive at 60 days	150 days
	--do--	---	---	--do--	--do--	72.4% epi.	56 alive at 70 days	180 days
	--do--	---	---	--do--	--do--	58% epi.	68 alive at 90 days	180 days
	--do--	---	---	--do--[4]	--do--	28-43% epi.	59-68 alive at 90 days	180 days
Michael and Emde, 1940	Mice	---	---	0.5% in benzene, 1 drop twice weekly	Skin	Carc.	High mortality	Over 4 mos.
	16 mice	---	F	1 mg. in olive oil, twice	S.C.	13 sarc.[5]	2 died in 60 days	At least 110 days
Morelli and Dansi, 1940	5 rabbits	---	---	12 mg. absorbed on 1 gr. Al_2O_3 and susperded in 25 cc. rabbit serum, 3 cc. 13 injections	I.V.	0	---	15 weeks
Morelli, 1940	10 rats	---	---	8 mg. in lard	---	6	6 alive at 4 mos.	4 mos.
	20 rats	---	---	In liquids extracted from rats with acetone alcohol and ether, 10 mg. average	---	1	10 alive at 4 mos.	--do--
	9 rats	---	---	In lecithin extracted from rat organs and muscles, 7 mg. average	---	3	9 alive at 235 days	235 days
	19 rats	---	---	In rat fat extracted with benzene, 10 mg. average	---	2	12 alive at 151 days	151 days
Mori and Nakahara, 1940a	7 rats	---	---	0.5% in olive oil, 0.2 cc. every 2 weeks	I.P.	3	---	At least 125 days
	7 rats	---	---	--do--[6]	--do--	2	---	--do--
Mori and Nakahara, 1940b	50 mice	---	M & F	0.5% in olive oil, 0.2 cc. weekly	I.P.	4 sarc.	---	125 days
	50 mice	---	--do--	--do--[6]	--do--	2 sarc.	---	--do--
Morton, J.J. et al., 1940	40 mice	Swiss	---	0.5% in benzene twice weekly[7]	Skin	30 carc.[9]	---	26 weeks
	40 mice	--do--	---	--do--[8]	--do--	15 carc.[9]	---	--do--
Morton, J.J. and Mider, 1940	350 mice	C57	M & F	0.5% in benzene twice weekly for 14 weeks[10]	Skin	284 pap., 160 carc.	---	165 days
Mottram, 1940	24 mice	White Bagg	---	0.5% in benzene twice weekly	Skin	---	Several killed early	150 days
	17 mice	Market	---	--do--	Skin	---	--do--	96 days

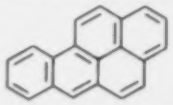
1. Received also nicotinamide (small doses).
2. Received also large doses of nicotinamide.
3. Received also calcium hexosediphosphate.
4. Received also different doses of glycuronic acid.
5. First within 60 days.
6. Received liver in diet.
7. Animals kept in dark.
8. Animals kept in daylight.
9. Also one sarcoma and papillomas.
10. Some mice also painted or injected with petroleum ether extract of mouse carcasses or injected with sesame oil.

778.--3,4-BENZPYRENE (Continued)



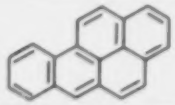
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Mottram, 1940 (Continued)	12 mice	White Bagg	---	1 mg. in olive oil	S.C., each flank	---	Several killed early	82 days
	20 mice	Market	---	--do--	--do--	---	--do--	75 days
Nonaka, 1940	Rats	Stock	---	1% soln. 0.05 cc. weekly	Uterine wall	0	---	---
	Mice	Stock	---	--do--	--do--	0[1]	---	---
	Mice	--do--	---	1% soln. 0.1 cc. weekly	S.C.	0	---	---
	Rats	--do--	---	1% soln. 0.05 cc. weekly	Mammary gland	0	---	---
	Mice	--do--	---	0.3% soln. 0.05 cc. weekly	Uterine wall	0[1]	---	---
	Mice	--do--	---	0.3% soln. 0.1 cc. weekly	S.C.	0	---	---
Notik, 1940	26 mice	---	---	---	Skin	pap. & carc.	---	At least 3½ mos.
Oberling and Guérin, 1940	60 fowls	---	---	---	Inj.(intra-medullary?)	0	---	---
Ohta, 1940a	17 rabbits	---	M & F	0.5 - 1.0% in olive oil, 0.1 cc., 1-6 injections weekly	Outer auditory canal	6 epi.[2]	2 died early 10 alive at 200 days	553 days
Peacock [3]	Fowls	---	---	Up to 10 mg.	Inj.	0	---	3 years
Pignatelli, 1940	6 rabbits	---	---	1% in olive oil 1.5 cc.	P.O.	Tumors	---	Ca. 115 days
Roussy and Guérin, 1940	10 rats	---	F	Pellet	Spleen	4[4]	9 alive at 1 year	2½ years
Roussy and Guérin, 1940/41	10 rats	White	F	Pellet	Spleen	4 sarc.	9 alive at 30½ mos.	30½ mos.
Rusch et al., 1940	5 rats	Stock	---	9.5-13 mg. (total dose) in corn oil	Bone marrow	2 sarc.	---	11 mos.
	--do--	--do--	---	1.5-2 mg. (total dose) in corn oil	Submucosa of stomach	3[5]	---	16 mos.
	2 rats	--do--	---	--do--	Submucosa of duodenum	0	---	17 mos.
	4 rats	--do--	---	1-2 mg. (total dose) in corn oil	Uterine horn	1 sarc.	---	16 mos.
	2 rats	--do--	---	1.5 mg. (total dose) in corn oil	Spleen	0	---	17 mos.
	1 rat	--do--	---	1 mg. (total dose) in corn oil	Submaxill. gland	0	---	14 mos.
	3 mice	C3H	---	0.2 mg. (total dose) in corn oil	Testis	0	---	6 mos.
	2 mice	--do--	---	0.5 mg. (total dose) in corn oil	Submaxill. gland	1 sarc.	---	6½ mos.
	9 mice	A	---	0.3-1.3 mg. (total dose) in corn oil	Spleen	0	---	14 mos.
	8 mice	A	---	0.3-0.5 mg. (total dose) in corn oil	Testis	0	---	9 mos.
	15 mice	A	---	0.3-0.7 mg. (total dose) in corn oil	Submaxill. gland	10 carc.[6]	---	7 mos.
	4 mice	C	---	0.3-0.5 mg. (total dose) in corn oil	--do--	2 carc.[7]	---	6 mos.
	200 mice	C	---	---	S.C.	100	---	Over 5½ mos.
	420 mice	C	---	In benzene	Skin	210	---	Over 5½ mos.
	160 mice	Stock	---	--do--	--do--	80	---	--do--

1. Myeloid changes observed.
2. First at 215 days; among the 7 dying before 200 days, 5 had tumors but not definitely malignant.
3. Cited by Beck, S., 1940.
4. First at 13 months; also peritoneal and ganglionic metastases.
5. One sarcoma, one myoma and one adenocarcinoma.
6. All at 2-3½ mos.
7. All at 3 mos.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
778.--3,4-BENZPYRENE (Continued) 								
Sall and Shear, 1940	20 mice	A	F	0.05% in benzene thrice weekly	Skin	18	---	44 weeks
	20 mice	A	F	0.02% in benzene thrice weekly	--do--	14[1]	4 alive at 60 weeks	82 weeks
	--do--	A	F	1 mg. in lard, 11 times	S.C.	15	4 alive at 7 mos.	7 mos.
	--do--	A	M	0.5 mg. in lard	S.C.	18	---	4 mos.
	--do--	A	M	0.1 mg. in lard	S.C.	7	10 alive neg. at 11 mos.	17 mos.
	--do--	A	F	1% in cholesterol	S.C.	4	10 alive at 15 mos.	15 mos.
Segale and Lacroix, 1940	50 rats	White	---	8, 10 and 12 mg. in oil, one and two injections	Bone marrow	70% sarc.	All dead in 45 days	45 days
Shear and Tilfeld, 1940	10 mice	D	---	5% in cholesterol[2]	S.C.	4 sarc.	1 alive at 11 mos.	11 mos.
	20 mice	D	---	1% in cholesterol	--do--	0[3]	3 alive at 11 mos.	--do--
	10 mice	D	---	0.1% in cholesterol	--do--	0[4]	2 alive at 11 mos.	--do--
	10 mice	D	---	0.01% in cholesterol	--do--	0[5]	5 alive at 11 mos.	--do--
	10 mice	D	---	0.001% in cholesterol	--do--	0	8 alive at 11 mos.	--do--
	20 mice[6]	A	---	1% in cholesterol	--do--	4	---	5 mos.
Shimkin and Andervont, 1940a	20 mice	C3H	M	0.25 mg. in tricaprylin	S.C.	18	---	24 weeks
	--do--	--do--	M	0.5 mg. in tricaprylin	--do--	19[7]	---	19 weeks
	--do--	--do--	M	1.0 mg. in tricaprylin	--do--	20[7]	---	17 weeks
	--do--	--do--	M	2.0 mg. in tricaprylin	--do--	20	---	20 weeks
	14 mice	Stock	M & F	0.25 mg. in tricaprylin	--do--	4	High mortality	40 weeks
	18 mice	--do--	--do--	0.5 mg. in tricaprylin	--do--	10[8]	---	--do--
	12 mice	--do--	--do--	1.0 mg. in tricaprylin	--do--	8	---	--do--
	15 mice	--do--	--do--	2.0 mg. in tricaprylin	--do--	9[8]	High mortality	--do--
Shimkin, 1940b	10 mice	A	---	0.25 mg. in lard	S.C.	4[9]	---	3 weeks
	10 mice	A	---	0.5 mg. in lard	--do--	3[9]	---	--do--
	--do--	A	---	1.0 mg. in lard	--do--	5[9]	---	--do--
Szarff, 1940	Mice	---	---	---	Inj.	Tumors[10]	---	---
Waldschmidt-Leitz et al., 1940	8 mice	---	---	1% in ether daily	Skin[11]	0[12]	---	50 days
Waterman, 1940	Mice	---	---	0.4% in lard	P.O.	Tumors[13]	---	---

1. First at 249 days; among the 7 dying before 200 days, 5 had tumors but not definitely malignant.
2. Pellets weighing 7-60 mg.
3. One mammary gland tumor.
4. 2 mammary gland tumors.
5. One generalized lymphomatosis.
6. Citing unpublished work of Shear and Sall.
7. First at 10 weeks.
8. First at 14 weeks.
9. Of the lung.
10. Others fed potassium salts showed higher incidence of tumors than those fed magnesium salts.
11. 4 of the animals also received injections of dl-glutamyl-glycine.
12. But "signs of cancer development" in 3 animals not receiving peptide.
13. Adenocarcinoma of stomach.

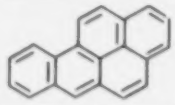
778.--3,4-BENZPYRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
White, A. and White, J., 1940	11 rats	---	M & F	55 or 40 mg. in sesame oil	I.P.	0	---	55 days
Baumann et al., 1941	Rats	---	---	1 mg. in colloidal suspension in aqueous gelatin	I.P.	0	---	8 weeks
Berenblum, 1941a	112 mice	Inbred white	---	1% in acetone weekly	Skin	79 pap.[1]	---	22 weeks
	--do--	--do--	---	0.05% in acetone weekly	Skin	5 pap.[1]	---	29 weeks
	36 mice	--do--	---	1% in xylene weekly	--do--	26 pap.[1]	---	26 weeks
	--do--	--do--	---	0.05% in xylene weekly	--do--	2 pap.	---	29 weeks
Berenblum, 1941b	36 mice	---	---	1% in acetone weekly	Skin	22[2]	36 alive at 20 weeks	At least 20 weeks
	--do--	---	---	0.05% in acetone weekly	Skin	1[3]	34 alive at 20 weeks	At least 21.5 weeks
Emmerman and Maisin, 1941	20 rats	White	---	0.25 cc. in 4% lard every 15 days, 5 injections[4]	S.C., thigh	11[5]	1 alive at 320 days	320 days
	--do--	--do--	---	--do--[6]	S.C.	13[7]	--do--	--do--
	--do--	--do--	---	0.25 cc. in 4% lard every 15 days, 5 injections[8]	S.C.	8[5]	3 alive at 320 days	320 days
	100 mice	--do--	---	0.5% in benzene 3 times a week, 20 times (7 mg. total dose)[9]	Skin	68[10]	10 alive at 180 days	180 days
	--do--	--do--	---	--do--[11]	--do--	73%	None alive at 180 days	--do--
	--do--	--do--	---	--do--[12]	--do--	64%	15 alive at 180 days	--do--
	--do--[13]	--do--	---	--do--[11]	--do--	47%	11 alive at 180 days	--do--
Chalmers and Crowfoot, 1941	Rats	---	---	1% in olive oil	S.C.	Tumors	---	---
Crabtree, 1941a	30 mice	Mixed	---	0.5% soln. in ether twice weekly	Skin	29[14]	---	18 weeks
	30 mice	--do--	---	0.5% in ether twice weekly	--do--	26[15]	---	20 weeks
	30 mice	--do--	---	0.5% in ether twice weekly	--do--	28[16]	---	15 weeks
	40 mice	--do--	---	0.5% in ether twice weekly for 8 weeks	--do--	11 pap., 1 epi.	---	40 weeks
	40 mice	--do--	---	--do--	--do--	6 pap., 1	29 alive at 40 weeks	--do--
Crabtree, 1941b	15 mice	Stock	---	0.5% in ether twice weekly	Skin	14[16]	---	40 weeks
	--do--	--do--	---	0.1% in ether twice weekly	--do--	14[17]	---	--do--

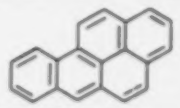
1. Many become malignant.
2. First at 12 weeks.
3. First at 21.5 weeks.
4. Both animals and preparation kept in darkness for 6 weeks.
5. At 180 days.
6. Rats kept in filtered light; benzpyrene for 15 minutes with U.V. light.
7. At 140 days.
8. Animals kept in filtered light; benzpyrene untreated.
9. Animals kept in dark.
10. At 40 days.
11. Plus irradiation with U.V. light for a total of 7½ hours.
12. Animals kept in darkness and in filtered light; benzpyrene irradiated previously by U.V. light.
13. Kept in darkness.
14. First papillomas at 7 weeks.
15. First papillomas at 8.5 weeks.
16. First papillomas at 9 weeks.
17. First papillomas at 8 weeks.

778.--3,4-BENZPYRENE (Continued)



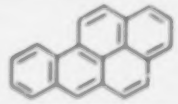
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Engel, 1941	20 mice	---	---	1 mg. in olive oil, thrice[1]	I.P.	5[2]	All died at 3 mos.	3 mos.
	11 mice	---	---	1 mg. in olive oil, thrice	I.P.	0	---	5 mos.
Furth and Barnes, 1941	3 mice	Rf	---	17.5 mg.	S.C.	3[3]	---	---
	5 mice	F_3 hybrid	---	--do--	--do--	4[4]	---	---
de Gaetani, 1941	18 rats	---	M & F	5-8 mg. in Ringer soln.[5]	I.V. & I.M.	Tumors[6]	---	Ca. 1 year
Gandolfi and Tanzi, 1941	20 rats	---	---	2 mg. in olive oil, every 15 days, 6 times	Eye	12[7]	12 alive at 3 mos.	At least 6 mos.
Gardner, 1941c	3 mice	CBAN	F castr.	0.3 mg. in sesame oil twice weekly	Vagina	0	---	271 days
	9 mice	Hybrids	--do--	--do--	--do--	5[8]	---	329 days
	39 mice	C3H	--do--	--do--	--do--	21[9]	---	321 days
Kremp, 1941	Rabbits	---	---	0.1% suspension; gelatin as protective colloid	I.V. & I.P.	0	---	4.7 mos.
Lanza, 1941	30 doves	---	---	1% in benzene every other day	Skin	Sarc.	---	Ca. 16 mos.
	5 doves	---	---	1 cc., 0.5% in olive oil weekly	S.C.	0	---	---
	5 doves	---	---	1 cc., 0.5% in olive oil every 15 days	Intra med.	0	---	---
Leuchtenberger and Sicher, 1941	534 mice	Rockland	F	0.4% in lard, 0.5 cc.	S.C.	208 sarc.	---	16 mos.
	335 mice	--do--	F	0.05% colloidal soln., 0.5 cc.	S.C.	24 sarc.	---	--do--
Lorenz et al., 1941	20 mice	C3H	M	0.25% dispersion in Aerosol O T soln., 0.1 or 0.2 cc.	S.C.	11 sarc.	---	53 weeks
Magat et al., 1941	Rats	---	---	2 mg. in paraffin and sunflower oil	I.M.	73[10]	---	300 days
	--do--	---	---	2 x 2 mg. of oil, intervals of 3 months	--do--	41[11]	---	212 days
	--do--	---	---	2 x 2 mg. of oil monthly	--do--	28[12]	---	175 days
	--do--	---	---	10 x 2 mg. in oil	--do--	17[13]	---	174 days
Matolcsy, 1941	Rats	---	---	Crystals	Artificial anus	0	---	At least 8 mos.
Michael and Ende, 1941	40 mice	---	M	1 mg. in olive oil, 2 doses	---	24	13 died at 60 days	130 days
	16 mice	---	F	--do--	---	13	2 died in 60 days	--do--
	40 mice	---	F	1 mg. in olive oil, 2 doses, plus gelatin	---	26	3 died in 60 days	--do--

1. Animals also received X-radiation.
2. Of the intestine; 4 adenocarcinomas of the intestines or stomach and one "rather seemed like an intestinal sarcoma."
3. One cutaneous tumor; also one leukemia.
4. One leukemia and lung tumors.
5. One mg. per cc.
6. Sarcomatoid rhabdomyomas; in one case, a pulmonary metastasis.
7. Fusocellular sarcomas; no metastases.
8. Of the perineum.
9. Of the perineum; 2 stomach papillomas and 8 stomach carcinomas. Stomach lesions beginning at 198 days.
10. 15 animals with metastases.
11. 7 animasl with metastases.
12. 8 animals with metastases.
13. 3 animals with metastases.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
778.--3,4-BENZPYRENE (Continued) 								
Michael and Emde, 1941 (Continued)	18 mice	---	M	1 mg. in olive oil, 2 doses, plus egg albumen	---	11	3 died in 60 days	130 days
	16 mice	---	F	--do--	---	--do--	7 died in 60 days	--do--
	20 mice	---	M	1 mg. in olive oil, 2 doses, plus horse serum	---	6	3 died in 60 days	--do--
	--do--	---	F	--do--	---	--do--	---	--do--
	--do--	---	M & F	1 mg. in olive oil, 2 doses, plus snake serum (Naja)	---	6	9 died in 60 days	--do--
Morton and Wilder, 1941	50 mice	dba	---	0.5% in benzene twice weekly	Skin	30 leukoses	---	---
	49 mice	dba_{212}	M & F	0.5% in benzene twice weekly	--do--	39 leukoses	---	---
Notik[1]	52 mice	---	---	0.3% in benzene for 3½ mos.	Skin	Pap. & sarc.	---	Over 3½ mos.
Polettini, 1941b	20 mice	White	---	0.20 cc. 0.25% soln. in olive oil, repeated injections	S.C., sacral region	Sarc.	---	At least 4 mos.
Riley and Wallace, 1941	50 mice	Inbred	M	0.5 mg. in olive oil	S.C.	18	13 neg. alive at 40 weeks	40 weeks
Pothlin and Gehlen, 1941	60 mice	---	M	0.5% in 1:1 ether-benzene soln., 3-5 times weekly	Skin	16 carc.	13 died spont.	167 days
	40 mice	---	M	--do--[2]	--do--	10 carc.	1 died at 61-120 days	--do--
Shear et al., 1941	7 mice	C57 bl.	M & F	Thread coated with benzpyrene	Liver	0	---	10 mos.
Stewart[3]	6 mice	C3H	M	Threads coated with benzpyrene	Testicles	0	---	12-20 mos.
Tchertkova[4]	90 mice	---	---	0.3% in benzene every 3 days for 4 mos.	Skin	Pap. & carc.	---	At least 6 mos.
	7 rabbits	---	---	0.3% in benzene every 2 days or 3 days for 7 mos.	Skin	0	---	At least 7 mos.
Waldschmidt-Leitz et al., 1941	34 mice	---	---	1% in ether daily[5]	Skin	0[6]	---	45 days
Warren and Gates, 1941	Guinea pigs	---	---	5 mg. in glycerine[7]	S.C.	4 sarc.[8]	53 alive at 196 days, 24 alive at 500 days	779 days
Zalesskaya[9]	40 mice	---	---	0.3% in benzene for 3½ mos.	Skin	Pap. & carc.	---	3½ mos.

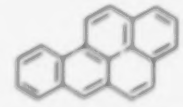
1. Cited by Larionow, 1941.
2. One received also injections of di-leucyl-glycine.
3. Cited by Shear et al., 1941.
4. Cited by Larionow, 1941.
5. 16 animals also received injections of di-glutamyl-glycine.
6. Bd warts in 9 animals not receiving peptide.
7. M.P. 178-179° Corr.
8. First at 340 days.
9. Cited by Larionow, 1941.

778.--3,4-BENZPYRENE (Continued)



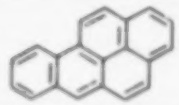
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Zimmerman and Arnold, 1941a	Mice	C3H	---	Pellet	Brain	Tumors[1]	---	Over 216 days
Baglioni, 1942	20 rats	---	---	10-15 mg. in 0.1 cc. oil of vaseline	Intra-cerebellum	3[2]	14 died early	276 days
Belsin, M., 1942	100 mice	Bagg albino	M & F	0.5% in benzene, 2 drops thrice weekly 25 times	Skin	58 carc.[3]	8 died early	530 days
	150 mice	--do--	--do--	--do--	--do--			
	500 mice	--do--	--do--	10 mg. crystals[5]	--do--	91 carc.[4]	2 died early	450 days
					S.C.	Tumors[6]	23 died early	---
Carruthers, 1942	10 rats	---	M & F	5 mg. in lard, 5 injections	I.P.	0	---	99 days
	6 mice	Swiss	---	0.5 mg. in lard, biweekly	I.P.	0	---	9 weeks
Dickens and Bell-Melhorbe, 1942	20 mice	Stock	M	0.5 mg. in sesame oil	S.C.	18 sarc.	---	---
	20 mice	Stock	M	0.5 mg. in arachis oil	S.C.	12 sarc.	---	---
	28 mice	--do--	M	0.5 mg. in liquid mouse fat	--do--	4 sarc.[7]	---	---
	16 mice	--do--	M	0.5 mg. in solid mouse fat	--do--	2 sarc.[7]	---	---
	30 mice	--do--	M	0.5 mg. in ox brain extract	--do--	1 sarc.	---	---
	11 mice	--do--	M	0.5 mg. in mouse lipins	--do--	0[7]	---	---
	55 mice	--do--	M	0.5 mg. in ox liver lipins	--do--	1 sarc.[7]	---	---
Fishman et al., 1942	10 mice	A	F	5% cholestrol pellets repeated application[8]	Vagina	10 carc.[9]	---	15 mos.
de Gaetani and Balli, 1942a	12 rats[10]	Albino	M & F	1% benzene soln. 102-238 times	Skin	Epi.[11]	---	At least 1 year
de Gaetani and Balli, 1942b	24 rats	Albino	M & F	0.25% in olive oil every 20 days	S.C.	Sarc.	---	100-360 days
	--do--[12]	--do--	--do--	--do--	--do--	--do--	---	--do--
	--do--[12]	--do--	--do--	0.25% in olive oil 20 days after irradiation	--do--	--do--	---	--do--
Gottschalk, 1942	20 mice	Stock	---	4000 micrograms in 0.5 cc. olive oil	S.C.	6 sarc.	0[13]	Over 130 days
	--do--	--do--	---	1265 micrograms in olive oil, 0.5 cc.	--do--	7 sarc.	10[13]	Over 154 days
	--do--	--do--	---	400 micrograms in 0.5 cc. olive oil	S.C.	1 sarc.	5[13]	Over 178 days
	--do--	--do--	---	126.5 micrograms in 0.5 cc. olive oil	S.C.	8 sarc.	12[13]	Over 199 days
	--do--	--do--	---	40 micrograms in 0.5 cc. olive oil	S.C.	1 sarc.	5[13]	Over 215 days
	--do--	--do--	---	4 micrograms in 0.5 cc. olive oil	--do--	1 sarc.	9[13]	Over 260 days
	--do--	--do--	---	0.4 micrograms in 0.5 cc. olive oil	--do--	0	15[13]	Over 255 days
	--do--	--do--	---	0.04 micrograms in 0.5 cc. olive oil	--do--	0	9[13]	Over 296 days
	140 mice	--do--	---	400 micrograms in varying amounts of olive oil	--do--	49 sarc.[14]	---	204 days
Monperi et al., 1942	Mice	---	---	0.5-0.8% solution in acetone once	Skin	0[15]	---	---

1. 8 gliomas and one mixed sarcoma and glioma.
2. Meningoblastoma.
3. Also papillomas, 18 lung tumors, 10 breast carcinomas and 1 squamous cell carcinoma of the stomach.
4. Also papillomas, 27 lung tumors and 5 fibrosarcomas.
5. Other animals received also injections of di-hydroxymethyl-peroxide with no evidence of either stimulating or preventative effect.
6. Epidermoid carcinoma 52%, fibrosarcoma 16%, rhabdomyosarcoma 12%, lung cancers 2%.
7. Serious primary or secondary leakage of material in these animals.
8. M.P. 178.6° Corr.
9. First at 7 months.
10. 4 groups of 3 each given different doses of x-radiation.
11. Squamous-cell.
12. X-irradiated.
13. Alive at appearance of first tumor.
14. Average latent period 128 days.
15. Cellular changes inc metastases!.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
778.--3,4-BENZPYRENE (Continued) 								
Jaret, 1962	50-60 rats or mice	---	---	---[1]	---	Tumors	---	Ca. 250 days
Kirschbaum, and Strong, 1962	52 mice	F	---	0.5% in benzene twice weekly	Skin	21[2]	---	At least 500 days
	59 mice	C3H	M	---do---	---do---	Tumors[3]	---	---
Morton et al., 1962	57 mice	C57 bl.	M & F	0.5% in benzene twice weekly[4]	Skin	18 carc.[5]	---	26 weeks
	60 mice	---do---	---do---	---do---[6]	---do---	36 carc.[5]	---	---do---
Reganey, 1962	135 mice	white	M & F	0.5% in benzene 2 or 3 times weekly	Skin	Tumors[7]	---	254-457 days
	157 mice	---do---	---do---	---do---	---do---	Tumors[8]	50% dead in 195 days	347-379 days
	135 mice	---do---	M	---do---	---do---	Tumors[9]	---do---	254-347 days
	157 mice	---do---	F	---do---	---do---	Tumors[10]	---do---	379-475 days
	51 mice	white	F castr.	---do---	---do---	Tumors[11]	50% dead in 110 days	245 days
Roussy et al., 1962c	10 rats	---	M & F	1% in olive oil, 1 cc.[12]	S.C.	6[13]	All died 59-9 mos.	9½ mos.
	9 rats	---	---do---	---do---[14]	---do---	7	All killed at 6 mos.	6 mos.
	8 rats	---	---do---	---do---[15]	---do---	6	All dead in 5-8 mos.	8 mos.
	10 rats	---	---do---	---do---[16]	---do---	9	---	10 mos.
Roussy et al., 1962a,d	20 mice	---	---	1 mg. in olive oil	S.C.	9	---	7 mos.
	20 mice	---	---	0.1 mg. in olive oil	S.C.	3	---	Over 13 mos.
	8 rats	---	---	1 mg. in olive oil	S.C.	6	---	8 mos.
	9 rats	---	---	0.1 mg. in olive oil	S.C.	6	---	Over 16 mos.
Rusch et al., 1962	40 mice	ABC	M & F	0.5% in benzene thrice weekly[17]	Skin	20 carc. & epi.	---	28 weeks
Schairer and Rechenberger, 1962	80 rats	---	M & F	15 mg. in olive oil[18]	I.M.	67 sarc.[19]	12 died early	Over 132 days
Steiner, 1962a	Rats	---	---	---	Salivary gland	Tumors (?)	---	---

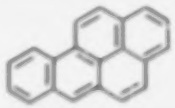
1. This experiment was done in an ionized atmosphere. Ionization was caused by radium preparations.
2. Carcinoma and papilloma. 15 developed leukemia before 300 days. Latent period 235 days (or 175 days on first 5% of animals to develop leukemia).
3. In almost all animals. No leukemia.
4. Animals kept in a light room.
5. Also papillomas.
6. Animals kept in a dark room.
7. In males at 126 days; in females at 86 days.
8. In males at 178 days; in females at 189 days.
9. First cancer in 178 days.
10. First cancer in adult females in 86 days, for young females 189 days.
11. First cancer in 147 days.
12. M.P. 174-176° (not purified by chromatography).
13. First tumors appeared at from 1-3 mos.
14. M.P. 176-177° purified by chromatography.
15. M.P. 177-178° purified by chromatography.
16. M.P. 178.5-180° purified by chromatography.
17. Other animals also painted with other hydrocarbons.
18. Some received also repeated I.P. injections of dl-leucyl-glycine and of Ringer soln.
19. 12 with metastases.

778.--3,4-BENZPYRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Steiner, 1942b	9 rats	---	M & F	5 mg. in cholesterol pellets	Salivary gland	6[1]	All alive at 15 mos.	18 mos.
Stewart and Lorenz, E., 1942	6 mice	C3H	M	0.5 mg. on thread[2]	Pyloric stomach	0	---	---
Tannenbaum, 1942a	50 mice	dba	M	0.5% in benzene, 1 drop weekly	Skin	32 pap. & carc.	---	60 weeks
	50 mice[3]	--do--	M	--do--	--do--	11 pap., 1 carc.	---	--do--
	50 mice	C57 bl.	F	0.2 mg. in lard	S.C.	37 sarc.	---	--do--
	--do--[3]	--do--	F	--do--	--do--	21 sarc.	---	--do--
	Mice	ABC	---	0.5% in benzene, 1 drop twice weekly	Skin	Pap. & carc.	---	---
	Mice	Swiss	---	--do--	Skin	Pap. & carc.	---	---
	Mice	--do--	---	0.2 mg. in lard	S.C.	Sarc.	---	---
Tannenbaum, 1942b	45 mice	JAX Swiss	F	0.5% in benzene, 1 drop twice weekly	Skin	22 pap. & carc.	---	42 weeks
	--do--[4]	--do--	F	--do--	--do--	28 pap. & carc.	---	--do--
	50 mice	C57 bl.	M	--do--	--do--	13 --do--	---	49 weeks
	--do--[4]	--do--	M	--do--	--do--	17 --do--	---	--do--
	--do--	dba	M	--do--	--do--	34 --do--	---	96 weeks
	--do--[4]	--do--	M	--do--	--do--	39 --do--	---	--do--
	40 mice	JAX Swiss	F	0.15 mg. in lard	S.C.	19 sarc.	---	52 weeks
	40 mice[4]	--do--	F	--do--	--do--	12 sarc.	---	--do--
	40 mice	JAX, ABC	F	0.1 mg. in lard	S.C.	3	---	51 weeks
	37 mice[4]	--do--	F	--do--	--do--	6	---	--do--
Bernblum and Schoental, 1945	20 mice	---	---	2 mg. in sesame oil, single injection	S.C.	18	---	10 mos.
	--do--	---	---	0.2 mg. in sesame oil	S.C.	8	---	--do--
	--do--	---	---	0.02 mg. in sesame oil	--do--	5	---	--do--
Bryan and Shimkin, 1943[5]	98 mice	C3H	M	0.5 to 8.0 mg. in tricaprylin[2]	S.C.	92	---	Over 3.9 mos.
	21 mice	C3H	M	0.25 mg. in tricaprylin	--do--	14	---	Over 4.4 mos.
	19 mice	--do--	M	0.125 mg. in tricaprylin	--do--	15	---	Over 5.1 mos.
	20 mice	--do--	M	0.062 mg. in tricaprylin	--do--	6	---	Over 5.8 mos.
	156 mice	--do--	M	0.00195 to 0.031 mg. in tricaprylin	--do--	0	---	Over 8.4 mos.
Collins et al., 1943	35 mice	C3H	F, castr.	0.5 mg. in sesame oil twice weekly	Vagina	7[6]	---	366 days
	98 mice	C3H, dm, C57, A, & CHI	M, F, & F castr.	--do--	P.O.	15[6]	---	up to 409 days

1. Mostly carcinomas first at 13 months.
2. M.P. 178.2-178.9° C. Corr.
3. Animals on calorie-restricted diet.
4. On high fat diet.
5. See Shimkin & Bryan, 1943, for morphology and growth of these tumors.
6. Gastric carcinoma of forestomach; also gastric papillomas, skin tumors from leakage.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
778.--3,4-BENZPYRENE (Continued) 								
Leiter and Shear, 1943	200 mice	A	M & F	0.065 or 0.1 mg. in lard filtrate	S.C.	84-94%	---	9 mos.
	--do--	A	--do--	0.065 or 0.1 mg. in lard residue	S.C.	4-14%	---	--do--
	180 mice	A	--do--	0.1 mg. in different samples of lard filtrate	--do--	50-100%	---	--do--
	775 mice	A	--do--	0.05-0.2 mg. in tricaprylin	--do--	24-82%	---	12 mos.
	80 mice	A	--do--	0.05-1.0 mg. in tributyrin	--do--	10-70%	---	9 mos.
	48 mice	A	--do--	0.05 or 0.1 mg. in cetane	--do--	0-4%	---	9 mos.
	50 mice	A	--do--	0.05 mg. in sesame oil	--do--	60%	---	9 mos.
	600 mice	A	--do--	0.065 or 0.1 mg. in tricaprylin containing lard fractions	--do--	4-78%	---	9 mos.
	200 mice	A	--do--	0.1 mg. in lard fractions containing 50% tricaprylin or 5% tristearin	--do--	0-94%	---	7.5 mos.
	50 mice	A	--do--	0.065 mg. in tricaprylin containing 5% tristearin	--do--	0	---	9 mos.
	50 mice	A	--do--	0.1 mg. in tricaprylin containing 0.4% tristearin	--do--	60%	---	9 mos.
	50 mice	A	--do--	0.1 mg. in tricaprylin containing 1% tripalmitin	--do--	46%	---	9 mos.
Puttinger, 1943	14 mice	Simpson	---	0.3% in liquid paraffin twice weekly for 139 weeks	Skin	8[1]	14 alive at 57 weeks	52 weeks
Rosenbohm, L. and Rosenbohm, A., 1943	Mice	---	---	133-1333 micrograms, 0.1 cc. paraffin, 4 injections	S.C.	Tumors	---	240-290 days
Roussy et al., 1943a	45 rats	---	---	Solid	S.C.	16	---	At least 54 weeks
Roussy et al., 1943b	10 rats	White	M & F	0.1% in olive oil[2]	S.C.	Tumors	---	1 year
	--do--	--do--	--do--	--do--[3]	--do--	8	---	At least 9 mos.
	9 rats	--do--	--do--	--do--[4]	--do--	6	---	At least 8 mos.
	--do--	--do--	--do--	--do--[5]	--do--	8	---	At least 7 mos.
	10 rats	--do--	--do--	--do--[6]	--do--	4	---	At least 8 mos.
	--do--	--do--	--do--	--do--[7]	--do--	7	---	--do--
Solanon, 1943	21 mice	C57 bl.	---	1% in acetone for 200 days, weekly	Skin	20[8]	---	280 days
Scholrer, 1943	180 rats	---	---	1 cc. 1.5% in olive oil	I.M.	112	---	40-60 days
Stewart and Lorenz, E., 1943	Mice	C3H, A, C, C57 bl., 1 & dba	M & F	0.2-0.8 mg. in mineral oil, lard, horse serum and impregnated cotton thread	Stomach wall	Tumors[9]	---	---

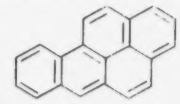
1. First appearance of papilloma (134 weeks); skin excised from treated area.
2. The benzpyrene exposed to light.
3. Benzpyrene exposed to light for 3 mos.
4. Benzpyrene exposed to light for 6 mos.
5. Benzpyrene kept in the dark.
6. Benzpyrene exposed to light for 10 mos.
7. Benzpyrene kept in darkness for 10 mos.
8. First at 150 days.
9. Of glandular stomach.

778.--3,4-BENZPYRENE (Continued)

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Veroni and Pirovano-Nasorcioctolo, 1965	Mice	---	---	1 drop 1/5-2% soln. in benzene twice weekly[1]	Skin	Tumors[2]	---	Ca. 32 weeks
Zimmerman, H. M. and Arnold, 1965	14 mice	C3H	M & F	Pellets	Brain	Gliomas	14 alive at 276 days	450 days
	15 mice	--do--	--do--	--do--	--do--	Sarc.	15 alive at 245 days	--do--
	1 mouse	--do--	--do--	--do--	--do--	Gliomas & sarc.	---	--do--
Crabtree, 1966	120 mice	Stock	---	0.05 to 0.5% in ether containing 2% liquid paraffin, twice weekly	Skin	Tumors[3]	---	---
von Euler et al., 1966	10 rats	---	---	5 mg. crystals in glycerin	Inj.	6	---	At least 5 mos.
Friedewald and Rous, 1966a	20 rabbits	---	---	0.5% in benzene, 2 or 3 times weekly	Skin	1 carc.[4]	---	3-15 mos.
	17 rabbits	---	---	0.5% in mineral oil twice weekly	--do--	1 carc.[5]	---	346 days
Wottram, 1966a	6 mice	---	F	0.02 cc., 0.5% in acetone thrice, plus croton oil	Skin	5[6]	---	At least 20 weeks
	--do--	---	F	0.02 cc. 0.5% in acetone, eight applications for 14 days, plus croton oil	--do--	15	---	--do--
	12 mice	---	F	0.02 cc., 0.5% in acetone twice, plus croton oil	--do--	Tumors[7]	---	--do--
Wottram, 1966b	6 mice	Stock	---	0.02 cc. of 0.5% in acetone[8]	Skin	Tumors[7]	---	At least 20 weeks
	--do--	--do--	---	--do--[9]	--do--	--do--	---	--do--
Peacock and Kirby, 1966	28 mice	Stock	---	0.4% in olive or cod-liver oil in food	P.O.	11 pap.[10]	---	571 days
Riley and Pettigrew, 1966	200 mice	Stock	M	0.7 mg. in olive oil[11]	S.C.	152[12]	15 neg. died, 33 neg. alive at 40 weeks	40 weeks
Rothlin, 1966	200 mice	---	---	In 0.5% ether-benzene 3 times weekly	I.V. & S.C.	Tumors	128 died in 120 days	At least 120 days
	100 mice	---	M	0.5% ether-benzene 3 times weekly	--do--	--do--	---	At least 125 days
	26 rats	White	---	1 cc. 0.5% in olive oil, 25 injections	S.C.	18	---	---
Roussy et al., 1966a	10 rats	---	---	Fragment	S.C.	5	1 died	Over 5 mos.

1. Irradiated and nonirradiated benzpyrene.
2. Many tumors; more with irradiated benzpyrene.
3. Controls receiving bromobenzene simultaneously on skin had lower incidence.
4. Also benign tumors.
5. No benign tumors.
6. One malignant.
7. 3 malignant.
8. Previously painted with croton oil.
9. Also a solution of croton oil in acetone.
10. Of the forestomach.
11. Some also injected with glyceraldehyde or d-glucose.
12. First at 11 weeks.

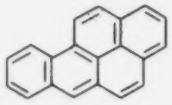
778.--3,4-BENZPYRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Roussy et al., 1944b	10 rats	---	---	1 cc. in oil	S.C.	8[1]	---	At least 5 mos.
	--do--	---	---	0.1 cc. in oil once	Inj.	1[1]	---	At least 4 mos.
Shimkin and Bryan, 1944	317 mice	C3H	M	0.00195-8 mg. in tricaprylin once	S.C.	127 sarc.	---	At least 8 mos.
Silberberg, M. and Silberberg, R., 1944	14 mice	Swiss	---	0.3% in benzene	Skin	0	---	28 days
Tannenbaum, 1944a	200 mice	dba	M	0.3% in benzene, 1 drop twice weekly for 10 weeks[3]	--do--	83 carc.[2]	---	52 weeks
Tannenbaum, 1944b	100 mice	C57 bl.	M	0.3% in benzene, 1 drop twice weekly for 13 weeks[3]	--do--	41 carc.	49 neg. alive at 49 weeks	49 weeks
	200 mice	dba	M	0.3% in benzene, 1 drop twice weekly for 10 weeks	--do--	146 carc.	<5 neg. alive 56 weeks	56 weeks
Thornton and Adams, 1944	150 rats	---	M & F	In olive oil, used to saturate string, sometimes repeated	Bronchial fistula	0[4]	19 alive at 5 days	Up to 118 days
Twort and Lyth, 1944	10 mice	---	---	0.2% in chloroform 5 times weekly	Skin	8[5]	---	[illegible] weeks
Weil-Malherbe and Dickens, 1944	22 mice	Stock	M & F	0.3 mg. in lecithin	S.C.	2 sarc.	8 alive at 14 mos.	At least 14 mos.
	19 mice	--do--	--do--	0.3 mg. in cephalin	--do--	1 sarc.[6]	9 alive at 14 mos.	--do--
	18 mice	--do--	--do--	0.3 mg. in tricaprylin	--do--	6 sarc.[6]	6 alive at 14 mos.	--do-
	19 mice	--do--	--do--	0.3 mg. in cod-liver oil	--do--	7 sarc.	4 alive at 14 mos.	--do--
Westphal, 1944	Rats	---	---	10 mg. in oil soln.	S.C.	1 sarc.	---	---
Berenblum, 1945	13 rabbits	Stock	---	0.5% in acetone, benzene, or xylene, up to 48 weeks, twice weekly	Skin, ear	2[7]	---	At least 48 weeks
Crabtree, 1945	25 mice	Stock	---	0.1% in ether containing 2% liquid paraffin, twice weekly	Skin	19	---	12 mos.
	--do--	--do--	---	0.3% in ether containing 2% liquid paraffin, twice weekly[8]	--do--	24	---	--do--
Eker, 1945	106 rats	Albino	M & F	4 mg., 1% in olive oil, once	S.C.	Sarc.	---	At least 160 days
	112 rats	--do--	--do--	20 mg. in olive oil, once	--do--	--do--	---	--do--
	27 rats	--do--	--do--	60 mg. in olive oil, 3 injections	--do--	--do--	---	--do--

1. With metastases.
2. And some papillomas.
3. On different sites.
4. Neoplasia of bronchial epithelium produced.
5. Average time of appearance 10.7 weeks.
6. Also a few other tumors at a distance.
7. Malignant; first wart at 33 weeks.
8. Other experiments with maleic anhydride, citraconic acid, malonic acid and certain aldehydes added.

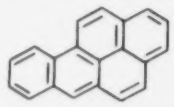
778.--3,4-BENZPYRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Glücksmann, 1945	36 mice	Albino	M & F	1% in acetone, 5-6 drops once	Skin	0[1]	---	At least 9 weeks
	86 mice	--do--	--do--	1% in acetone, 5-6 drops weekly	--do--	Pap. and carc.	---	120 days
	12 rats	Stock	--do--	1% in acetone weekly	--do--	0	---	15 mos.
Mottram, 1945	6 mice	---	---	0.03 cc. 0.3% in acetone weekly	Skin	6[2]	---	15 weeks
Pullinger, 1945	40 mice	Strong, Ax. C57 bl.	M	0.05% in acetone, 0.1 cc. weekly	Skin[3]	38 pap. and carc.	39 alive at 21 weeks	21 weeks
Rusch et al., 1945a	159 mice	C	M & F	0.2 mg. in cottonseed oil or mouse fat[4]	S.C.	118 sarc.	40 neg. alive at 6 mos.	6 mos.
	119 mice	ABC	M & F	0.1 mg. in mouse fat or corn oil	--do--	44 sarc.	75 neg. alive at 9 mos.	9 mos.
	267 mice	--do--	--do--	0.1 mg. in methyl caprate, ethyl palmitate, ethyl stearate, ethyl oleate or ethyl linoleate	--do--	91 sarc.	160 neg. alive at 9 mos.	9 mos.
	191 mice	C	--do--	0.1 mg. in tricaprylin and tricaprylin plus added ethyl stearate, ethyl oleate, ethyl linoleate and lecithin	S.C.	103 sarc.	78 neg. alive at 9 mos.	9 mos.
	240 mice	ABC	--do--	0.106 mg. in ethyl linoleate, ethyl oleate, lard filtrate and lard residue	S.C.	90 sarc.[6]	121 neg. alive at 9 mos.	9 mos.
Rusch et al., 1945b	Mice	---	---	200 micrograms in corn oil[5]	S.C.	40-85%[7]	---	4 mos.
Rusch et al., 1945c	320 mice	C	--do--	0.2 mg. in corn oil[8]	S.C.	64-90% sarc.	---	200 days
Tannenbaum, 1945a	310 mice	dba	M	0.3% in acetone, 1 drop semi-weekly	Skin	43-98% carc. and pap.	---	53 weeks
Tannenbaum, 1945b	151 mice	dba	M	0.3% in benzene twice weekly, 17 or 25 times	Skin	13-46% carc. and pap.	73 neg. alive at 53 weeks	53 weeks
Allsopp, 1946	90 mice	---	---	0.15 ml. 5 times weekly[9]	Skin	32	---	At least 9 weeks
Armstrong and Bonser, 1946	26 mice	IF	M & F	0.3% solution in benzene weekly	--do--	Tumors	---	At least 40 weeks
	16 mice	Kreyberg	--do--	--do--	--do--	--do--	---	At least 64 weeks
	--do--	Strong A	--do--	--do--	--do--	--do--	---	--do--
	19 mice	Black Agouti	--do--	--do--	--do--	--do--	---	--do--

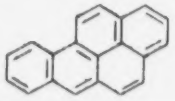
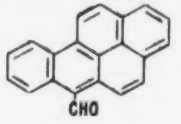
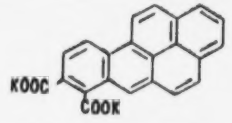
1. Changes noted.
2. Malignant.
3. Skin excised from painted area.
4. With or without added alpha-tocopherol.
5. Some on calorie-restricted diet.
6. Low incidence with ethyl linoleate and lard residue both without added alpha-tocopherol.
7. Higher tumor incidence and shorter latent period with high calorie diets.
8. Different diets.
9. Benzpyrene irradiated with ultraviolet rays.

778.--3,4-BENZPYRENE (Continued)

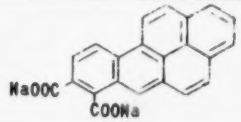
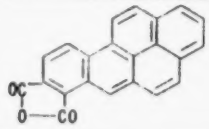
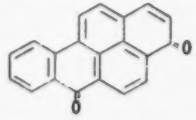


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Beck, S., 1946	14 mice	CBA	---	0.04 mg. per day in soap solution	P.O.	6[1]	6 alive at 42 weeks	At least 97 weeks
Chevallier et al., 1946	Rats	---	---	In olive oil	Inj.	0	---	At least 2 mos.
	--do--	---	---	In rat fat	--do--	0	---	At least 8 mos.
	Guinea pigs	---	---	In olive oil	--do--	0	---	At least 2 mos.
	--do--	---	---	In guinea pig fat	--do--	0	---	At least 8 mos.
Chirico, 1946	24 rats	---	M	10 mg. in 1 cc. lard	Inj.	Sarc.	---	4 mos.
Crabtree, 1946	Mice	MRC/H	---	15 mgm. in ether 10 times a day for 3 days[3]	Skin	Tumors	---	25-33 days
Dickens and Weil-Malherbe, 1946	30 mice	---	---	0.3 mgm. in tricaprylin plus equal parts of mouse fat	S.C.	17 sarc.	---	60 weeks
	--do--	---	---	0.3 mgm. in tricaprylin plus equal parts of hydrogenated mouse fat	--do--	22 sarc.	---	--do--
	--do--	---	---	0.3 mgm. in tricaprylin plus equal parts of cod-liver oil	--do--	7	---	--do--
	--do--	---	---	0.3 mgm. in tricaprylin plus equal parts of hydrogenated cod-liver oil	--do--	4	---	--do--
Driessens, 1946	20 rats	Wistar	---	0.012 g. 6 injections in 3 mos.[2]	S.C.	Sarc.	---	At least 120 days
Eisen, 1946	26 rats	August, Sherman and Wistar	M & F	1 mgm. in pellet	S.C.	Sarc.[4]	---	At least 248 days
Lewis and King, 1946	267 rats	Stock	M & F	1-4 mg. in olive oil	S.C.	Sarc.	All lived	At least 295 days
Quattrin, 1946	Mice	---	---	4% in lard; 1 mg.	Intra-hepatic	Tumors[5]	---	6-18 mos.
	--do--	---	---	4% in lard; 7-12 mg.	--do--	---	---	--do--
Silberberg, M. and Silberberg, R., 1946	64 mice	RF_1	M & F	0.3% in benzene	Skin	Carc.	Killed at 10-45 days	3 mos.
Weil-Malherbe and Dickens, 1946	30 mice	Glaxoff	F	0.3 mgm. in tricaprylin plus 3% phosphatids	S.C.	8 sarc.	---	30 weeks
	--do--	--do--	F	0.3 mgm. in tricaprylin	--do--	12 sarc.	---	--do--
	--do--	--do--	F	0.3 mgm. in tricaprylin plus 3% cholesterol	--do--	23 sarc.	---	--do--

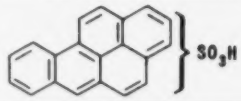
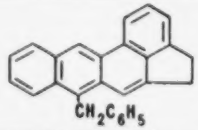
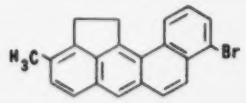
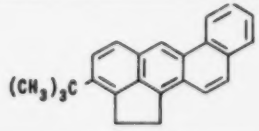
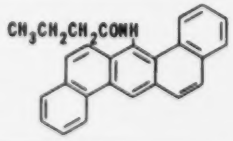
1. Lung nodules observed.
2. One month after last injection of benzpyrene; 2 cc. embryonic extract twice a week was injected.
3. Applied also with benzene, naphthalene, phenanthrene, and anthracene.
4. Of the liver.
5. Many tumors showed pulmonary and splenic neoplasms.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
778.--3,4-BENZPYRENE (Continued) 								
Eker, 1947	176 rats	Albino	M & F	4-60 mg. 1% soln. of olive oil	S.C.	Tumors	---	81-146 days
	32 rats	--do--	---	4 mg. 1% soln. in olive oil	--do--	Tumors[1]	---	Ca. 140 days
Greenblatt and Kupperman, 1947	Rats	White	---	Pellets; 10-15 mg.	Implant	0	---	180 days
	--do--	--do--	---	1 mg. in 0.05 cc. sesame oil every other day for 40 days	S.C.	Sarc.	---	180 days
Locatelli, 1947	Rats	---	---	10-25 mg.	S.C.	Tumors[2]	---	Up to 4 mos.
	Rabbits	---	---	30-100 mg.	S.C.	Tumors	---	--do--
	Rats	---	---	10-25 mg.	I.M.	Tumors	---	--do--
	Rabbits	---	---	30-100 mg.	--do--	Tumors	---	--do--
	Rats	---	---	10-25 mg.	I.P.	Tumors	---	--do--
	Rabbits	---	---	30-100 mg.	--do--	--do--	---	--do--
Lusky et al., 1947	70 mice	Albino	M	0.3% soln. in ether plus 2% liquid paraffin twice a week	Skin	Tumors	---	14 weeks
	55 mice	--do--	--do--	--do--	--do--	--do--	40 alive at 17 weeks	17 weeks
Rindone, 1947	20 rats	White	---	0.02 g. in olive oil, 0.4 cc. weekly for 10 weeks	I.M.	Sarc.	---	Ca. 173 days
Roussy and Guérin, 1947	50 mice	---	---	1 cc. crushed liver from rats fed benzpyrene	S.C.	0	---	At least 1 year
Shimkin and Wyman, 1947	209 mice	C3H	M	0.002-0.5 mg. in cholesterol pellets	S.C.	53 sarc.	---	Ca. 24 mos.
779.--3,4-BENZPYRENE-5-ALDEHYDE 								
Shear and Leiter, 1940	10 mice	A	M	2 mg. crystals	S.C.	10^3	All lived	6 mos.
780.--3,4-BENZPYRENE-3',4'-DICARBOXYLIC ACID, Potassium salt 								
Shear, 1937b	Mice	Inbred	---	---	S.C.	0	---	---
Shear, 1939	10 mice	A	M	9 mg. crystals	--do--	0[4]	4 died in 2 days, 5 alive at 15 mos.	15 mos.

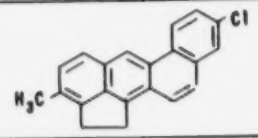
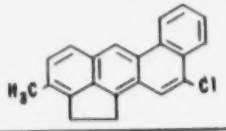
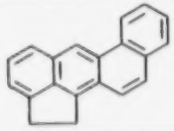
1. First tumor at approximately 45 days; fibrosarcomas, 3 with glandular metastases.
2. Changes in mitochondria of liver cells.
3. First at 3 mos.
4. One lymphoma.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
781.--3,4-BENZPYRENE-3',4'-DICARBOXYLIC ACID, Sodium salt 								
Shear, 1937b	Mice	Inbred	---	---	S.C.	0	---	---
Shear, 1939	20 mice	A	F	10 mg. crystals, repeated injections	--do--	0	10 died in 5 days	14 mos.
	10 mice	A	M	4.5 mg. crystals	--do--	0[1]	4 alive at 14 mos., 8 alive at 12 mos.	13 mos.
	6 mice	C3H	---	0.2% in saline, 0.1 cc. to 1 cc.	I.P.	0	---	6 mos.
782.--3,4-BENZPYRENE-3',4'-DICARBOXYLIC ANHYDRIDE 								
Shear, 1937b	Mice	Inbred	---	---	S.C.	0	---	---
Shear, 1939	14 mice	A	M	10 mg. crystals, repeated injections	S.C.	0[2]	11 alive at 1 year, 6 alive at 18 mos.	19 mos.
783.--3,4-BENZPYRENE PICRATE[3]								
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	5 epi., 0 pap.[4]	6 alive at 6 mos.	353 days
784.--3,4-BENZPYRENE-5,8-QUINONE 								
Herenblum and Schoental, 1943	10 mice	---	---	Ca. 2 mg. in sesame oil, single injection[5]	S.C.	0	Most alive at 7 mos.	10 mos.

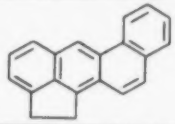
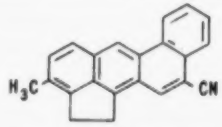
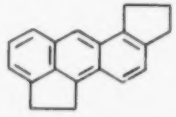
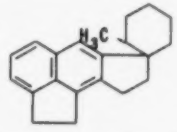
1. Lung nodules observed.
2. One animal bore a tumor of the lung and of a regional lymph node.
3. Benzpyrene to picrid acid in the molecular ratio 1:1.
4. Similar results obtained with a mixture of benzpyrene and picric acid.
5. Crude preparation used.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
785.--3,4-BENZPYRENE-SULFONIC ACID 								
Windaus and Rennhak, 1937	---	---	---	(1)	---	0	---	---
786.--10-BENZYLACENAPHTHANTHRACENE 								
Cook, 1932b	20 mice	Stock	---	0.5% and 1% in benzene	Skin	0	7 alive at 6 mos., 3 alive at 1 year	710 days
787.--4'-BROMO-7-METHYL-8,9-ACE-1,2-BENZANTHRACENE 								
Shear and Leiter, 1941a	10 mice	A	M & F	5 mg. crystals, repeated injections	S.C.	0	---	14 mos.
788.--20-t-BUTYLCHOLANTHRENE 								
Shear[2]	Mice	---	---	---	S.C.	0	---	4 mos.
Shear, 1941**	10 mice	A	M	5 mg. crystals, repeated injections	S.C.	2	---	14 mos.
Shear and Leiter, 1941a	10 mice	A	M	5 mg. crystals, three injections	S.C.	2[3]	4 neg. alive at 11 mos.	15 mos.
789.--9-n-BUTYRYLAMINO-1,2,5,6-DIBENZANTHRACENE 								
Cook, 1932b	10 mice	---	---	0.3% in benzene	Skin	0	3 alive at 6 mos.	320 days
Barry et al., 1935	--do--	Stock	---	0.3% in benzene twice weekly	Skin	0	3 alive at 6 mos., 2 alive at 1 year	476 days

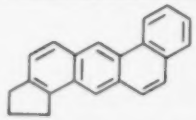
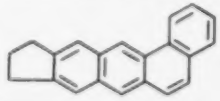
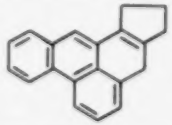
1. M.P. 146-148°.
2. Unpublished results cited by Fieser and Snow, 1938.
3. First at 10 months.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
790.--3-CHLORO-20-METHYLCHOLANTHRENE 								
Shear, 1941**	10 mice	A	M	5 mg. crystals, repeated injections	S.C.	0	---	14 mos.
Shear and Leiter, 1941a	10 mice	A	M	5 plus 5 mg. crystals	S.C.	0	4 alive at 12 mos.	14 mos.
791.--6-CHLORO-20-METHYLCHOLANTHRENE 								
Shear, 1941	20 mice	A	M	2 mg. crystals, repeated injections	S.C.	0	---	9 mos.
Shear and Leiter, 1941a	20 mice	A	M	2 plus 5 mg. crystals	S.C.	0	3 alive at 10 mos.	10 mos.
792.--CHOLANTHRENE 								
Shear, 1936a	13 mice	A	---	10 mg. crystals[1]	S.C.	2[2]	10 died or killed early	88 days
	10 mice	A	---	--do--	S.C.	10[3]	---	106 days
	--do--	D	---	--do--	S.C.	9[4]	1 animal killed	130 days
Bachmann et al., 1957	60 mice	Stock	---	0.3% in benzene twice weekly	Skin	23 epi., 5 pap.	17 alive at 6 mos.	224 days
Haddow, 1938c	20 rats	Wistar	---	0.2% in lard, 1 cc. repeated injections	Inj.	10	---	25 weeks
Orr, 1938	10 mice	Stock	---	0.3% in benzene weekly	Skin	Tumors	---	18 weeks
	--do--	--do--	---	0.3% in acetone, weekly, 3 times	--do--	--do--[5]	---	--do--
Page, 1938	34 mice	---	---	0.3% in benzene weekly	--do--	9 epi.[6]	Many killed early	196 days
Shear, 1938a	10 mice	D	F	1.25 mg. in lard, repeated injections	S.C.	5	4 neg. died in 3 mos.	13 mos.
Donlach and Mottram, 1940	15 mice[7]	Inbred albino	---	0.5% in benzene, twice weekly for 140 days[8]	Skin	9 cancers, 6 pap.	---	250 days

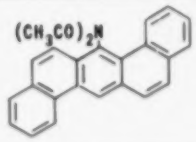
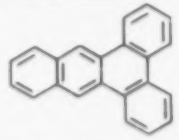
1. M.P. 175-175.5° Corr.
2. First tumor at 61 days.
3. First tumor at 76 days; 4 of the animals with tumors at 88 days.
4. First tumor at 90 days; 5 of the animals with tumors at 90 days.
5. First at 4 weeks.
6. First at 18 weeks.
7. Animals kept in dark.
8. Purified in dark.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
792.--CHOLANTHRENE (Continued) 								
Bradbury et al., 1941	13 mice	Inbred	---	5 mg. in sesame oil	S.C.	11 sarc.	1 alive neg. at 4 mos.	4 mos.
Law and Lewisohn, 1941	30 mice[1]	C	M & F	1 mg. in olive oil	S.C.	27 sarc.[2]	---	23 weeks
793.--6-CYANO-20-METHYLCHOLANTHRENE 								
Shear, 1941	20 mice	A	M & F	2 mg. crystals	S.C.	0	---	8 mos.
Shear and Leiter, 1941a	20 mice	A	M	2 mg. crystals	S.C.	0	9 alive at 9 mos.	9 mos.
794.--1,2-CYCLOPENTENO-5,10-ACEANTHRENE 								
Shear[3]	Mice	---	---	---	S.C.	0	---	4 mos.
Shear and Leiter, 1941a	20 mice	A	M & F	1 mg. in lard, 4 injections	S.C.	4[4]	10 neg. alive at 12 mos.	18 mos.
Shear, 1941**	20 mice	A	M & F	1 mg. in lard, repeated injections	S.C.	4	---	17 mos.
795.--1,2-CYCLOPENTENOACENAPHTHENE-3'-spiroCYCLO-2"-METHYLCYLOHEXANE 								
Bachmann et al., 1937	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	16 alive at 6 mos., 10 alive at 1 year	743 days

1. Effective total.
2. First at 7 weeks; mean latent period 11.7 weeks; 34.6% with lung tumors.
3. Unpublished results cited by Fieser and Hershberg 1937a.
4. First at 6 months.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
796.--5,6-CYCLOPENTENO-1,2-BENZANTHRACENE 								
Cook, 1931	10 mice	---	---	0.5% in benzene twice weekly	Skin	1 epi., 2 pap.	4 alive at 155 days	At least 200 days
Cook, 1932b	10 mice	Stock	---	0.5%[2] in benzene twice weekly	Skin	1 epi.,[1] 2 pap.	3 alive at 6 mos.	224 days
	--do--	--do--	---	--do--	--do--	4 epi., 1 pap.	5 alive at 6 mos.	321 days
	--do--	--do--	---	0.1%[2] in benzene	--do--	4 epi.	6 alive at 6 mos.	339 days
	--do--	--do--	---	0.5%[3] in benzene twice weekly	--do--	8 epi.	8 alive at 6 mos.	285 days
	--do--	--do--	---	0.5%[4] in benzene twice weekly	--do--	1 epi., 2 pap.	4 alive at 6 mos.	358 days
Cook, 1933a	Mice	---	---	---	Skin	Tumors[5]	---	---
Barry and Cook, 1934	10 rats	---	---	0.2% in lard	S.C.	8[6]	---	530 days
	20 mice	---	---	--do--	--do--	4[7]	9 alive at 105 days	280 days
Barry et al., 1935	40 mice	Stock	---	0.5% in benzene twice weekly	Skin	14 epi., 5 pap.	20 alive at 6 mos.	358 days
	10 mice	--do--	---	0.1% in benzene	--do--	5 epi.	6 alive at 6 mos.	339 days
	20 mice	--do--	---	0.05% in benzene	--do--	1 epi., 1 pap.	18 alive at 6 mos., 14 alive at 1 year	795 days
797.--6,7-CYCLOPENTENO-1,2-BENZANTHRACENE 								
Cook, 1933a	Mice	---	---	---	Skin	Tumors	---	---
Barry et al., 1935	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	6 epi.,[5] 1 pap.	9 alive at 6 mos., 5 alive at 1 year	559 days
798.--Δ3-DEHYDRO-3,4-TRIMETHYLENE-ISOBENZANTHRENE-2 								
Shear, 1941**	10 mice	M	M	5 mg. crystals, repeated injections	S.C.	6	---	19 mos.

1. In all these experiments the average time of appearance of first tumor was 143 days.
2. Substance pure. M.P. 197-199°.
3. Substance purified through the picrate.
4. Substance impure; mixture of isomers used.
5. In many cases metastases to axillary lymph gland.
6. First tumor at 364 days; metastases to lung.
7. Metastases to spleen.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
799.--9-DIACETYLAMINO-1,2,5,6-DIBENZANTHRACENE 								
Cook, 1932b	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	5 alive at 175 days	175 days
800.--1,2,3,4-DIBENZANTHRACENE 								
Kennaway, 1930	10 to 20 mice	---	---	Less than 1%[1] in benzene	Skin	0	---	---
Kennaway and Hieger, 1930	10 mice	---	---	---	--do--	0	3 died early	133 days
Cook et al., 1932b	10 mice	Stock	---	0.3 and 1%[2] in benzene	--do--	0	1 alive at 6 mos.	252 days
	--do--	--do--	---	--do--	--do--	1 epi.	7 alive at 6 mos., 3 alive at 1 year	709 days
	20 mice	--do--	---	--do--	--do--	0	12 alive at 6 mos., 4 alive at 1 year	458 days
	--do--	--do--	---	--do--	--do--	1 epi.	12 alive at 6 mos., 9 alive at 1 year	756 days
	10 mice	--do--	---	0.25 and 0.5%[3] in benzene twice weekly	--do--	1 epi.	8 alive at 6 mos., 5 alive at 1 year	733 days
Barry et al., 1936	20 mice	Stock	---	0.5%[4] in benzene twice weekly	--do--	0	11 alive at 6 mos., 2 alive at 1 year	487 days
Orr, 1938	15 mice	--do--	---	0.3% in benzene weekly	Skin	0	---	18 weeks
Orr, 1939	10 mice[5]	--do--	---	0.3% in acetone weekly	--do--	0	---	--do--
801.--1,2,5,6-DIBENZANTHRACENE[7]								
Kennaway, 1930	10 mice	---	---	Saturated soln. (less than 1%) in benzene	Skin	1 pap.	3 alive at 232 days	232 days
	--do--	---	---	Saturated soln.[6] in benzene	--do--	4 epi., 1 pap.	6 alive at 169 days	252 days
Kennaway and Hieger, 1930	10 mice	---	---	---	--do--	1 epi.	3 alive at 285 days	285 days
	--do--	---	---	(6)	--do--	4	---	270 days

1. Substance not specially purified.
2. M.P. 185-189°.
3. Different samples of substance melting at 185-189°, 194-198°, and 203-204° used.
4. Pure substance used.
5. See under 1,2,5,6-dibenzanthracene.
6. Compound is incorrectly called 1,2,7,8-dibenzanthracene.
7. For formula see Addenda.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
801.--1,2,5,6-DIBENZANTHRACENE (Continued)								
Burrows, 1932	10 rats	---	---	0.4% in olive-oil emulsion 0.5 and 1 cc. weekly	I.P.	8[1]	---	49 weeks
	136 mice	---	---	In lard, and various mixtures of lard and milk	S.C.	0	7 alive at 462 days	482 days
	25 rats	---	---	In lard	S.C.	0	20 alive at 582 days	582 days
Burrows, 1932	50 mice	---	---	In fresh pork fat	S.C.	0	---	Up to 400 days
	--do--	---	---	In olive oil	S.C.	0	---	--do--
	--do--	---	---	In sperm oil	S.C.	0	---	--do--
	--do--	---	---	In cod-liver oil	S.C.	0	---	--do--
	--do--	---	---	In lard	S.C.	6	---	216 days
Burrows et al., 1932	95 mice	---	---	In lard	S.C.	31	---	Over 231 days
	67 rats	---	---	--do--	S.C.	15	45 alive at 5 mos.	At least 5 mos.
Cook et al., 1932b	20 mice	Stock	---	0.5%[2] in benzene twice weekly	Skin	14 epi., 1 pap.[3]	19 alive at 6 mos.	545 days
	10 mice	--do--	---	--do--	--do--	1 epi., 4 pap.	6 alive at 6 mos., 1 alive at 1 year	435 days
	20 mice	--do--	---	--do--	--do--	8 epi., 1 pap.	11 alive at 6 mos.	536 days
	10 mice	--do--	---	--do--	--do--	1 epi., 2 pap.	5 alive at 6 mos.	545 days
	13 mice	--do--	---	--do--	--do--	2 epi., 3 pap.	7 alive at 6 mos.	512 days
	20 mice	--do--	---	0.05% in benzene	--do--	4 epi., 1 pap.	10 alive at 6 mos., 6 alive at 1 year	436 days
	10 mice	--do--	---	0.2 to 0.4% in lard	--do--	0 epi., 3 pap.	6 alive at 6 mos., 1 alive at 1 year	368 days
	--do--	--do--	---	0.5% in benzene plus isocholesterol	--do--	2 epi.	8 alive at 6 mos., 2 alive at 1 year	585 days
Burrows, 1933	2 fowls	White Wyandotte	F	24 mg. in lard, 3 injections	I.M.	1[4]	1 died neg. in 8 mos.	10 mos.
Cook, 1933a	Mice	---	---	---	Skin	Tumors	---	---
Lacassagne, 1933c	9 rabbits	---	F	0.1 to 0.4% in lard, 1 cc. every 15 days	Breast	0	6 died in 12 mos.	12 mos.
	8 rabbits	---	---	--do--	Knee joint	0	2 died early	--do--
	2 rabbits	---	---	--do--	I.V.	0	--do--	--do--
	6 rabbits	---	M	--do--	Testis	1[5]	--do--	At least 5 mos.
Malein and Liégeois, 1933	50 mice	---	---	Saturated soln. in benzene 3 times weekly	Skin	5 epi., 8 pap.[6]	---	Ca. 303 days

1. First in 23 weeks; ½ of the animals tumorous at 49 weeks.
2. Substance melting at 261-261.5° white, purified by sulfuric acid, was used. Data on less pure product are not included.
3. First at 130 days. ½ of the animals tumorous in 230 days.
4. Also metastases to liver, ovary, right lung.
5. At about 5 months.
6. First at about 175 days.

801.--1,2,5,6-DIBENZANTHRACENE (Continued)

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Peacock, 1955a	Fowls	---	---	Suspension in lard or egg-yolk fat	I.M.	12 sarc.	---	---
Peacock, 1955b	31 fowls	Plymouth Rock	---	0.4% in lard 0.5 to 1 cc., 4 injections	Breast	10 sarc.	---	14 mos.
Peacock, 1955c	Fowls	---	---	Suspension in lard				
	12 fowls	---	---	0.75 mg. in egg-yolk fat	Inj.	11 sarc.	---	---
					Inj.	1 sarc.	---	---
Andervont, 1954	125 mice	A	M & F	0.4% in lard, 0.25 cc. repeated injections	S.C.	58[1]	---	27 weeks
	102 mice	W	M & F	--do--	S.C.	38	---	27 weeks
	19 mice	C3H	--do--	--do--	S.C.	11[2]	---	--do--
	58 mice	CBA	--do--	--do--	--do--	31[3]	---	--do--
	23 mice	D	--do--	--do--	--do--	6[4]	---	--do--
	41 mice	Stock	M	--do--	--do--	9	---	--do--
Barry and Cook, 1954	10 rats	---	---	0.2% in lard	S.C.	7[4]	---	217 days
	--do--	---	---	--do--	S.C.	1	2 alive at 91 days	182 days
	20 mice	---	---	--do--	S.C.	0	2 alive at 140 days	210 days
Berenblum and Kendal, 1954	12 rats	---	---	2.5 and 5 mg. in aqueous suspension	S.C.	3	9 died early	7 mos.
	18 fowls	Plymouth Rock	M	0.01% colloidal solution, 2 cc. weekly	I.M.	7[5]	6 died neg. in 12 weeks	80 weeks
	12 fowls	--do--	M	0.01% colloidal solution, 1 cc. every 2 weeks	--do--	0	---	18 mos.
	12 fowls	--do--	M	--do--[5]	--do--	1	---	--do--
Chalmers, 1954	6 fowls	---	---	In egg-yolk fat or lard[6]	I.M.	0	---	18-24 mos.
Keijser, 1954	16 mice	---	---	0.17% in lard, 0.5 cc., 5 injections	S.C.	6 sarc.[7]	---	327 days
	10 mice	---	---	0.2% in lard, 0.5 cc., 5 injections	--do--	9 sarc.[8]	---	324 days
	--do--	---	---	0.4% in lard, 0.5 cc., 5 injections	S.C.	6 sarc.[9]	---	302 days
	25 mice	---	---	4 mg. crystals	S.C.	2[10]	---	Over 348 days
	10 mice	---	---	0.4% in lard, 0.25 cc.	I.M.	2 sarc.[11]	---	Over 284 days
Maisin and Coolen, 1954	10 rats	---	---	0.4% in lard, 0.25 cc. monthly	Inj.	5[12]	11 alive at 200 days	At least 369 days
	8 rats	---	---	0.4% in lard, 0.25 cc. oftener than monthly	Inj.	--do--	--do--	--do--
Seelig, 1954	127 mice	Stock	M & F	0.3% in benzene 1 to 3 times weekly	Skin	31 carc. 2 sarc.	65 dead in 7 mos.	294 days
Andervont, 1955	140 mice	Stock	---	0.4% in lard, 0.2 cc. 1 to 5 injections	S.C.	60[13]	64 alive at 28 weeks	28 weeks

1. All animals developed lung tumors.
2. ½ of animals were tumorous in about 21 weeks.
3. ½ of animals were tumorous in about 26 weeks.
4. Metastases to axillary gland, mesentery, lungs, etc.
5. With the addition of kieselguhr in suspension.
6. Bulk of dibenzanthracene proved to be removed from site in a few days.
7. Also 7 lung adenomas or carcinomas.
8. Also 6 lung adenomas or carcinomas.
9. Also 3 lung adenomas or carcinomas.
10. Also 4 lung nodules.
11. Also one lung nodule and one adenoma or carcinoma. Metastases to lymph nodes.
12. Of the lungs; one hepatoma.
13. Many lung tumors which were not reported.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
801.--1,2,5,6-DIBENZANTHRACENE (Continued)								
Andervont, 1935 (Continued)	113 mice	D	---	0.4% in lard, 0.2 cc., 1 to 3 injections	S.C.	52	51 alive at 28 weeks	28 weeks
	95 mice	C3H	---	--do--	S.C.	67	2 alive at 28 weeks	--do--
	15 mice	C3H	---	0.4% in lard, 0.2 cc., 2 injections	S.C.	15	---	--do--
	24 mice	A	---	--do--	S.C.	23	---	--do--
	19 mice	CBA	---	--do--	S.C.	17	---	--do--
	53 mice	Stock	---	0.4% in lard, 0.2 cc., 3 injections[1]	S.C.	21	---	7 mos.
Bagen and Loomis, 1935	Mice	---	---	0.5% in benzene twice weekly	Skin	16	33 alive at 6 mos.	Over 1 year
Bostrom, 1935	20 mice	---	---	2 mg. in lard, 2 injections	S.C.	5[2]	14 died in 4 mos.	4 mos.
Boyland and Burrows, 1935	18 rats	---	---	0.05% colloidal solution, 2 cc. twice weekly	S.C.	9	10 died neg. in 19 weeks	Ca. 51 weeks
	--do--	---	---	--do--	S.C.	6	--do--	--do--
	--do--	---	---	--do--	--do--	5	--do--	--do--
	--do--	---	---	--do--	--do--	4	--do--	--do--
	--do--	---	---	--do--	--do--	4	14 died neg. in 25 weeks	Ca. 38 weeks
	--do--	---	---	--do--	--do--	3	--do--	--do--
	10 mice	---	---	0.05% colloidal solution, 0.4 cc. twice weekly	I.P.	2	9 died neg. in 27 weeks	Ca. 40 weeks
	--do--	---	---	--do--	--do--	3	--do--	--do--
	4 rabbits	---	---	Solution in emulsified olive oil plus aqueous colloidal solution	S.C.	0	3 alive neg. at 185 weeks	185 weeks
	--do--	---	---	in aqueous lecithin emulsion weekly	I.V. then S.C.	0	3 died early	160 weeks
	4 rabbits	---	---	in emulsified olive oil, weekly plus colloidal aqueous soln.	S.C.	0	3 died neg.	168 weeks
	10 rats	---	---	1 mg. in soln.	S.C.	0	9 alive at 12 mos.	18 mos.
	--do--	---	---	0.33 mg. in soln.	S.C.	0	5 alive at 12 mos.	--do--
	--do--	---	---	0.12 mg. in soln.	S.C.	0	3 alive at 12 mos.	--do--
	--do--	---	---	0.04 mg. in soln.	S.C.	0	6 alive at 12 mos.	--do--
	--do--	---	---	0.014 mg. in soln.	S.C.	0	9 alive at 12 mos.	--do--
	--do--	---	---	0.005 mg. in soln.	S.C.	0	6 alive at 12 mos.	--do--
Dobrovolskaia-Zavadskaia, 1935	17 mice	RIII	F	0.1% in lard, every 2 or 3 days	Vagina	0[3]	Majority died in 7 to 9 mos.	2 years
	4 mice	XXX	F	--do--	--do--	0	--do--	--do--
Lynch, 1935	60 mice	Bagg Albino	M & F	0.4% in lard, 0.33 cc., 3 injections	S.C.	45[4]	Majority dead by 200 days	At least 200 days
	44 mice	--do--	M & F	--do--	S.C.	33[4]	--do--	--do--
	29 mice	--do--	M & F	--do--	--do--	26[4]	--do--	--do--

1. ½ of animals also were injected with kaolin, with no difference in the results.
2. Lung metastases in one case.
3. 9 tumors elsewhere as in controls.
4. Also high incidence of lung tumors.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
801.--1,2,5,6-DIBENZANTHRACENE (Continued)								
Lynch, 1955 (Continued)	52 mice	Yellow	M & F	0.4% in lard, 0.33 cc., 3 injections	S.C.	29[1]	Majority dead by 200 days	At least 200 days
	10 mice	1198	--do--	--do--	S.C.	9[1]	--do--	--do--
	55 mice	A	M	--do--	S.C.	29[1]	--do--	--do--
	18 mice	62	M & F	--do--	S.C.	15	--do--	--do--
Orr, 1955	100 mice	---	---	Saturated solution in benzene weekly	Skin	1[2]	59 alive at 28 weeks	31 weeks
	50 mice	---	---	--do--[3]	--do--	--do--	22 alive at 28 weeks	--do--
	100 mice	---	---	--do--[4]	--do--	4[2]	32 alive at 28 weeks	--do--
	49 mice[5]	---	---	Saturated solution in benzene weekly	--do--	3[2]	12 alive at 28 weeks	--do--
Peacock, 1955a	31 fowls	Barred Rock	---	0.4% in lard	I.M.	15 sarc.	10 alive at 31 mos.	45 mos.
	12 fowls	--do--	---	0.4% in egg-yolk fat, 0.1 to 0.5 cc.	--do--	2 sarc.	4 alive at 9 mos.	24 mos.
Peacock, 1955b	10 fowls	R.I. Red	---	2 to 8 mg. in egg-yolk fat	Inj.	0	5 alive at 1 year	2 years
	12 fowls	Brown Leghorn	---	1 to 2 mg. in chicken fat	--do--	0	7 alive at 1 year	15 mos.
	Fowls	---	---	In lard	--do--	Tumors	---	---
Schabad, 1955a	15 mice	---	---	1 mg. in sunflower-seed oil	S.C.	9[6]	---	6 mos.
Schabad, 1955b	20 mice	---	M & F	1 mg. in sunflower-seed oil, 3 injections	S.C.	5[7]	4 alive at 6 mos.	At least 6 mos.
Andervont, 1956	30 mice	Stock	F	0.4% in lard, 0.25 cc., 2 injections	S.C.	2	29 alive at 3 mos.	7 mos.
	40 mice	--do--	F	--do--[8]	S.C.	16	36 alive at 3 mos.	--do--
	30 mice	--do--	F	0.4% in lard, 0.25 cc., 2 injections	S.C.	3	27 alive at 3 mos.	34 weeks
	36 mice	--do--	F	--do--[8]	S.C.	11	29 alive at 3 mos.	34 weeks
	32 mice	--do--	F	--do--	S.C.	8	17 alive at 3 mos.	--do--
Bell and Samuels, 1956	45 rats	---	M & F	0.1% in olive oil every 2 weeks	S.C.	33[9]	33 alive at 13 mos.	13 mos.
	50 rats	---	---	0.1% in lard every 2 weeks	S.C.	6	---	--do--
Berenblum and Kendal, 1956	44 mice	---	---	2 mg. in lard	I.P.	1	9 alive at 20 weeks	At least 20 weeks
	40 mice	---	---	Ca. 1.9 mg. in aqueous colloidal solution	I.P.	4	---	At least 200 days

1. Also high incidence of lung tumors.
2. Also many other tumors, benign, and of doubtful malignancy.
3. Animals received also injections of ephedrine sulfate.
4. Animals received also injections of adrenaline hydrochloride.
5. Bearing scar tissue.
6. First at 3 months. Also 6 lung adenomas and one skin papilloma.
7. Also 6 primary lung adenomas.
8. Plus injection of trypan blue.
9. Mostly fibrosarcomas.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
801.--1,2,5,6-DIBENZANTHRACENE (Continued)								
Bradbury, 1936	5 rats	---	---	0.5 mg. in sesame oil	S.C.	3	---	8-9 mos.
Branch, 1936	150 mice	A	---	0.5% in benzene biweekly	Skin	33	65 died in 34 weeks	34 weeks
	75 mice	A	---	--do--[1]	--do--	10	30 died in 34 weeks	--do--
	150 mice	C57	---	--do--	--do--	59	53 died in 30 weeks	30 weeks
	75 mice	--do--	---	--do--[1]	--do--	23	35 died in 30 weeks	30 weeks
	75 mice	A	---	1% in sesame oil	S.C.	12	42 died in 14 weeks	14 weeks
	--do--	C57	---	--do--	S.C.	5	61 died in 14 weeks	14 weeks
Burrows, 1936d	162 rats	---	---	---	S.C.	55	109 alive at 4 mos.	46 to 81 weeks
	10 rats	---	---	In food	P.O.	0	All alive at 4 mos.	87 weeks
	100 mice	---	---	---	S.C. and I.P.	27	42 alive at 4 mos.	28-66 weeks
	10 mice	---	---	---	S.C.	5	7 alive at 4 mos.	54 weeks
Burrows et al., 1936	30 rats	Stock	---	In lard (?)	I.P.	12	23 alive at 4 mos.	94 weeks
	50 rats	--do--	---	In lard or olive oil	I.P.	19	41 alive at 4 mos.	At least 4 mos.
	10 mice	---	---	--do--	I.P.	21	49 alive at 4 mos.	--do--
Clowes and Chen, 1936	Mice	---	---	In sesame oil, different doses, single or repeated injections	S.C. and intracutaneous	Tumors	---	---
Dobrovolskaia-Zavadskaia, 1936	6 mice	XXXIII	---	0.2% in olive oil, 0.05 cc., 2 injections	S.C.	4	---	Not over 14 mos.
	27 mice	RIII	---	--do--	--do--	14[2]	---	--do--
	5 mice	XVII	---	--do--	S.C.	2	---	--do--
	11 mice	XXX	---	--do--	--do--	4	---	--do--
	13 mice	RIV	---	--do--	--do--	4	---	--do--
	10 mice	IVB	---	--do--	--do--	3	---	--do--
	10 mice	XIX	---	--do--	--do--	2	---	--do--
	6 mice	Other inbred strains	---	--do--	--do--	3	---	--do--
Dunning et al., 1936	202 rats	---	---	1% in paraffin	S.C.	44	---	435 days
Haagensen and Krehbiel, 1936a	96 mice	---	---	1% in paraffin	S.C.	14	82 alive at 4 mos.	275 days
	198 rats	---	---	---	S.C.	26	128 alive at 4 mos.	500 days

1. Plus injection of trypan blue.

2. First at 4.5 months.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
801.--1,2,5,6-DIBENZANTHRACENE (Continued)								
Haagensen and Krehbiel, 1936a (Continued)	6 rabbits	---	---	---	S.C.	2	All alive at 4 mos.	379 days
Hieger, 1936	28 rats	---	---	0.1 to 9 mg. in lard	S.C.	2	---	20 to 30 weeks
	Mice	---	---	0.3% in benzene twice weekly for 8 weeks	Skin	0	---	16 weeks
	--do--	---	---	0.3% in benzene tv ice weekly for 16 weeks	--do--	Several	---	24 weeks
Ilfeld, 1936	21 mice	A	---	5% in cholesterol	Kidney	5	---	---
	23 mice	C3H	---	--do--	--do--	5	---	---
	7 mice	M	---	--do--	--do--	0	All died of disease	---
	--do--	---	---	--do--	--do--	2	---	---
	50 mice	---	---	--do--	Spleen	0	---	11 mos.
	6 rats	---	---	--do--	--do--	0	---	11 mos.
	22 mice	A	---	--do--	Liver	0	---	At least 10 mos.
	20 mice	C3H	---	--do--	--do--	2	---	--do--
	14 mice	M	---	--do--	--do--	0	---	--do--
	5 rats	---	---	--do--	--do--	0	---	--do--
	21 mice	---	F	--do--	Uterus	1	---	---
	19 mice	---	M	--do--	Testis	0	---	9 mos.
	11 rats	---	---	--do--	Femur	0	---	12 mos.
	Dog	---	---	--do--	under periosteum and femur	0	---	12 mos.
	--do--	---	---	--do--	Stomach wall	0	---	12 mos.
	6 ferrets	---	---	--do--	Under gastric serosa	0	---	4 mos.
	2 mice	Stock	---	--do--	Brain cortex	0	---	8 mos.
Lorenz and Shear, 1936	Mice	---	---	In lard	S.C.	Tumors	---	At least 9 mos.
McEuen, 1936	4 rats	---	F	In olive oil	Uterus	0	---	At least 4.5 mos.
	--do--	---	F, castr.	--do--	--do--	0	---	--do--
Orr, 1936	Rabbits	---	---	0.4% in lard, 2.5 cc.	Kidney	1[1]	---	31 mos.
Perry, 1936	Mice	---	F, normal and castr.	0.5% in benzene[2]	Skin	Tumors[3]	---	Over 10 mos.
Polson, 1936	12 rabbits	---	---	30 to 200 mg. in liquid paraffin	I.P.	0	---	---
Reimann and Hall, 1936	200 mice	---	---	0.3% in benzene daily	Skin	Tumors[4]	---	Over 244 days
Schabad and Chaletskaia, 1936	Mice	---	---	2 mg. in sunflower-seed oil	I.P.	--do--	---	---

1. Of the jaw (adamantinoma).
2. Plus 0.05% to 0.1% estrone in benzene.
3. 3 carcinomas of the uterus; carcinoma of the breast in 43% of animals.
4. Carcinoma in 38% of animals; tumors of all kinds in 68% of animals. First tumor in 244 days.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
801.--1,2,5,6-DIBENZANTHRACENE (Continued)								
Shear, 1936a	40 rats	---	---	0.4%[1] in lard, 2 cc. monthly	S.C.	11	18 alive at 6 mos.	1 year
	48 mice	Stock	---	5% in cholesterol	S.C.	17[2]	26 alive at 6 mos.	1 year
	63 mice	A	---	in cholesterol	S.C.	3[3]	49 alive at 1 year	14 mos.
Andervont, 1937a	40 mice	A	F	0.4% in lard, 0.2 cc.	S.C.	28[4]	5 died neg.	7 mos.
	55 mice	---	F	--do--	S.C.	35	9 died neg.	6 mos.
	30 mice	M	F		--do--	7	---	---
	40 mice	A	F	1 mg. in lard	--do--	4	---	---
	28 mice	A	F	--do--	--do--	0	26 alive at 3 mos.	3 mos.
Andervont, 1937b	38 mice	A, C57	F	0.4% in lard, 0.2 cc., 2 injections	S.C.	13[4]	23 died early	---
	59 mice	First hybrid generation	M & F	--do--	S.C.	47	10 died early	---
	62 mice	--do--	F	--do--	S.C.	54	1 died early	10 mos.
	305 mice	Second hybrid generation	M & F	--do--	S.C.	231	12 died early	6 mos.
Andervont, 1937c	20 mice	A	F	1 to 1.5 mg. in cholesterol	S.C.	13[5]	---	3 mos.
	30 mice	A	F	1 mg. in lard	S.C.	19[5]	---	3 mos.
	30 mice	A	F	1 mg. in glycerol-water suspension	S.C.	17[5]	---	--do--
	20 mice	A	F	1 mg. in horse serum	S.C.	20[5]	---	--do--
	14 mice	A	---	1 mg. on thread	Lungs	8[5]	---	--do--
	3 mice	C3H	---	--do--	--do--	2[5]	---	--do--
	4 mice	C57 black	---	--do--	--do--	2[5]	---	--do--
Andervont, 1937d	40 mice	A	F	1.6 mg. in lard, 2 injections	S.C.	28[6]	---	7 mos.
	28 mice	A	F	0.8 mg. in lard	--do--	0[7]	2 neg. died early	3 mos.
	121 mice	Het.[8]	---	in lard	--do--	108[5]	---	---
	305 mice	Het.[9]	---	--do--	--do--	228[5]	---	---
	20 mice	C3H	M	0.6 mg. in dog serum	--do--	10[10]	14 neg. alive at 9 mos.	9 mos.
	--do--	--do--	M	0.6 mg. in lard	--do--	6[11]	17 neg. alive at 9 mos.	9 mos.
Andervont and Lorenz, 1937a	57 mice	Several inbred	---	0.0015 mg. in horse serum	I.V.	0	42 alive at 9 mos.	9 mos.
	Mice	A, C3H, M	---	1 mg. in lard or horse serum	S.C. or I.P.	Tumors[12]	High mortality	9 mos.
	18 mice	A, M	---	0.21 to 0.28 mg. in dog serum	I.V.	6[13]	---	4 mos. and 1 year
	24 mice	C3H	M	0.21 mg. in dog serum plus 0.8 mg. in lard	I.V. and S.C.	24[14]	---	7 mos.
	12 mice	C3H	M	0.8 mg. in lard	S.C.	12[15]	---	6 mos.
	20 mice	C3H	M	0.63 mg. in dog serum and 0.8 mg. in lard	S.C.	20[15]	---	6.5 mos.

1. In this paper substance used melted at 265.5°-266°, Corr.
2. First at 4 months.
3. First at 3 months. One tumor arose from pellet containing 0.0004 mg. dibenzanthracene.
4. Many lung tumors also reported.
5. Of the lung.
6. Also 25 lung tumors.
7. 25 lung tumors.
8. Hybrid A-C57 black, first generation.
9. Hybrid A-C57 black, second generation.
10. Liver tumors also obtained.
11. Also one lung tumor.
12. Both subcutaneous and intraperitoneal.
13. Of the lung.
14. Also lung tumors and one liver tumor.
15. Also lung tumors.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
801.--1,2,5,6-DIBENZANTHRACENE (Continued)								
Andervont and Lorenz, 1937a (Continued)	20 mice	C3H	M	0.8 mg. in lard	S.C.	17[1]	---	16.5 mos.
	--do--	A	F	0.1 mg. in horse serum, 5 injections	I.V.	14[2]	---	11 mos.
	30 mice	C3H	F	1 mg. in lard	S.C.	26[3]	---	36 weeks
	--do--	--do--	F	1 mg. in horse serum	S.C.	27[4]	---	--do--
	24 mice	C3H	F	1.6 mg. in glycerol	S.C.	16[5]	---	--do--
	20 mice	--do--	F	0.6 mg. in lard	S.C.	17[6]	---	--do--
Andervont and Lorenz, 1937b	11 mice	C3H	---	2 mg. on charcoal	S.C.	10[7]	---	36 weeks
	10 mice	--do--	---	2 mg. in glycerol	S.C.	8[8]	---	--do--
	24 mice	--do--	---	1 mg. in horse serum plus charcoal	--do--	23[9]	---	--do--
	20 mice	--do--	---	1 mg. in horse serum	--do--	17[4]	---	--do--
	12 mice	A	F	2 mg. on charcoal	S.C.	2	---	6 mos.
	10 mice	A	F	2 mg. crystals	--do--	2[10]	---	--do--
	28 mice	A	F	0.5 mg. in horse serum	I.V.	28[2]	---	14 weeks
	36 mice	A	F	0.5 mg. on charcoal	I.V.	Tumors[11]	---	18 weeks
Askanazy, 1937	9 rats	---	---	4 mg. in tallow, 3 injections	I.P.	2 sarc.[12]	5 died neg. in 5 weeks	12.5 mos.
Barnes and Furth, 1937	102 mice	---	---	0.5% aqueous susp., 0.2 to 0.4 cc. weekly for 10 weeks	I.V.	0	---	At least 10 weeks
Claude, 1937	18 rabbits	---	---	0.4% in lard, 2.5 to 3.8 cc. weekly to monthly or more	S.C.	0	6 alive at 2.5 years	At least 2.5 years
	4 rabbits	---	---	5 mg. per kg. body weight in colloidal soln. weekly[13]	Inj.	0	---	---
Cook et al., 1937	Mice	---	---	In food	P.O.	0	---	---
	Rats	---	---	--do--	P.O.	0	---	---
Creech and Franks, 1937	Mice	---	---	In olive oil, repeated injections	Inj.	30	33 alive at 11 mos.	At least 11 mos.
Dessy, 1937	5 rabbits	---	---	2 mg. in lard, repeated injections	Intra-medullary	0	---	50 days
Dyadyusha, 1937	Mice	---	---	In benzene every 3 days	Skin	0	All died of epidemic at 5.5 mos.	5.5 mos.
Foulds, 1937	1 fowl	Barred Rock	---	In lard, 3 injections	---	1	---	---
Haddow et al., 1937	14 rats	Lister	M & F	10 mg. in sesame oil	I.P.	0	---	100 days
	Ca 10 rats	--do--	--do--	15 mg. in sesame oil, 2 injections	I.P.	0	---	38 days
	9 rats	--do--	--do--	45 mg. in sesame oil, 2 injections	I.P.	0	---	40 days
	14 rats	--do--	--do-	3 mg. in sesame oil	I.P.	0	---	28 days
	9 rats	--do--	--do--	10 mg. in sesame oil	I.P.	0	---	29 days

1. Also lung tumors and one liver tumor.
2. Of the lung.
3. ½ of animals tumorous in 19 weeks.
4. Also lung tumors; ½ animals tumorous in 24 weeks.
5. ½ of animals tumorous in 30 weeks.
6. With lung and liver tumors also; ½ of animals tumorous in 18 weeks.
7. ½ of animals tumorous in 23 weeks.
8. ½ of animals tumorous in 22 weeks.
9. ½ of animals tumorous in 20 weeks.
10. Also lung tumors.
11. Of the lung in all alive.
12. Of the abdominal cavity.
13. Colorless grade of substance used.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
801.--1,2,5,6-DIBENZANTHRACENE (Continued)								
Hval, 1937	40 mice	---	M	2 mg. in lard, repeated injections	S.C. abdominal wall	18 sarc.[1]	27 alive at 120 days	300 days
	30 mice	---	---	2 mg. in lard	--do--	0	Many killed early	140 days
	30 mice	---	---	--do--	--do--	0[2]	--do--	90 days
	60 mice	---	---	2 mg. in lard, 3 injections	--do--	0	--do--	135 days
	14 mice	---	---	--do--	--do--	0	--do--	89 days
Kinosita, 1937	Rat	---	---	In cholesterol	Liver	0	---	---
	--do--	---	---	--do--	Kidneys	0	---	---
	Rabbit	---	---	--do--	Under periosteum	0	---	---
	*--do--	---	---	--do--	Bone marrow	0	---	---
	--do--	---	---	--do--	Brain	0	---	---
	Pigeon	---	---	--do--	--do--	0	---	---
	Toad	---	---	--do--	I.M.	0	---	---
Lees, 1937a	Rats	Lister	---	2.5 to 20 mg. in sesame oil	I.P.	0	---	65 days
Lees, 1937b	12 rats	--do--	M	10 mg. in sesame oil	I.P.	0	---	43 days
Lettinga, 1937	10 mice	---	M	1 mg. in lard, 5 injections	S.C.	6 sarc.[3]	1 died early	205 days
	--do--	---	M	0.5 mg. in lard, 5 injections	S.C.	8 sarc.[4]	2 died early	166 days
	--do--	---	M	0.2 mg. in lard, 5 injections	S.C.	9 sarc.[5]	---	204 days
	--do--	---	M	0.1 mg. in lard, 5 injections	S.C.	10 sarc.[6]	---	165 days
	--do--	---	M	0.05 mg. in lard, 5 injections	S.C.	9 sarc.[7]	---	180 days
	--do--	---	M	--do--	S.C.	10 sarc.[8]	---	257 days
	--do--	---	F	0.025 mg. in lard, 5 injections	S.C.	2 sarc.[9]	---	302 days
	--do--	---	M	0.01 mg. in lard, 5 injections	S.C.	10 sarc.[10]	---	281 days
	--do--	---	M	0.0025 mg. in lard, 5 injections	S.C.	3 sarc.[11]	6 neg. alive at 302 days	302 days
	--do--	---	M	0.001 mg. in lard, 5 injections	S.C.	0	All alive at 302 days	--do--
	--do--	---	M	0.05 mg. in lard, 5 injections	S.C.	7 sarc.[12]	---	252 days
	--do--	---	M	0.025 mg. in lard, 5 injections	S.C.	8 sarc.[13]	---	252 days
	--do--	---	M	0.01 mg. in lard, 5 injections	S.C.	4 sarc.[14]	8 alive at 252 days	252 days
	--do--	---	M	0.0025 mg. in lard, 5 injections	S.C.	0	--do--	252 days
	--do--	---	F	0.001 mg. in lard, 5 injections	S.C.	0[15]	5 alive at 252 days	--do--
Lewis, M. R., 1937	Mice	Inbred	---	0.8 mg. in lard	S.C.	80	---	---
Lewis and Lichtenstein, 1937	--do--	A, C3H, BA & C57 black	---	0.8 mg. in lard or olive oil	I.P.	200[16]	---	12-15 mos.

1. First at 123 days. Also 4 lung adenomas, one breast adenoma, and one lymphosarcoma.
2. 2 breast adenomas and one lipogranuloma.
3. First at 111 days. Also 8 primary lung tumors, and one liver sarcoma. Metastases to lungs.
4. First at 91 days. All animals developed primary lung tumors; metastases to lungs.
5. First at 80 days. Also 3 primary lung tumors. Metastases to lungs.
6. Also one primary lung tumor and lung metastases.
7. First in 80 days. Also 3 primary lung tumors and one lymphosarcoma in chest cavity. Metastases to lungs.
8. First at 93 days. One with lung metastases.
9. Also one lung tumor and 6 mammary adenocarcinomas. Metastases to lungs.
10. First at 84 days. Lung metastases.
11. First at 215 days; also one more possible sarcoma.
12. First in 84 days; also two more possible sarcomas. Two primary lung tumors; metastases to lung.
13. First in 118 days. Also two primary lung tumors. One with metastases to lungs, and one with metastases to para-esophageal gland.
14. First at 186 days. Also one lymphosarcoma of mesentery.
15. 3 (possibly 4) mammary adenocarcinomas with lung metastases.
16. Majority of tumors appeared between 90 and 150 days.

801.--1,2,5,6-DIBENZANTHRACENE (Continued)

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Lorenz and Andervont, 1937	57 mice	Inbred	---	0.0015 mg. in horse serum	I.V.	0	42 alive at 9 mos.	9 mos.
	Mice	--do--	---	1 mg. in horse serum dispersion, or in lard	S.C. or I.P.	Sarc.	Many died of infection	At least 9 mos.
	18 mice	A, M	---	0.28 mg. (total dose) in dog serum	I.V.	6[1]	---	Up to 1 year
	24 mice	C3H	M	0.21 mg. (total dose) in dog serum plus 0.8 mg. in lard	I.V. & S.C.	25[2]	---	7 mos.
	12 mice	C3H	M	0.8 mg. in lard	S.C.	12	---	6 mos.
	20 mice	C3H	M	0.63 mg. (total dose) in dog serum plus 0.8 mg. in lard	I.V. & S.C.	20[3]	---	36 weeks
	20 mice	C3H	M	0.8 mg. in lard	S.C.	16[4]	---	--do--
	--do--	A	F	0.5 mg. (total dose) in horse serum	I.V.	14[5]	---	11 mos.
	30 mice	C3H	F	1 mg. in lard	S.C.	26	---	36 weeks
	--do--	--do--	F	1 mg. in horse serum	S.C.	27	---	--do--
	24 mice	--do--	F	1.6 mg. in glycerol	S.C.	16	4 neg. alive at 36 weeks	36 weeks
	20 mice	--do--	M	0.6 mg. (total dose) in dog serum	S.C.	6[6]	---	36 weeks
	--do--	--do--	M	0.6 mg. (total dose) in lard	S.C.	17[6]	---	--do--
Magnus, 1937	Mice	---	---	0.096 g., total dose	Stomach[7]	Tumors[8]	69 alive at 6 mos.	At least 6 mos.
Nakano, 1937a	17 rats	---	---	0.5 or 1% in benzene weekly	Skin	1 pap.	---	150 days
	16 rats	---	---	1% in sesame oil weekly	S.C.	5 sarc.	---	150 days
Nakano, 1937b	Mice	Stock	---	1% in benzene	Skin	Pap.[9]	---	Over 170 days
	--do--	--do--	---	1% in sesame oil	S.C.	Tumors[10]	---	Over 85 days
Orr, 1937	60 mice	---	---	Saturated soln. in benzene weekly	Skin	Tumors	46 alive at 15 weeks	33 weeks
Perry and Ginzton, 1937	35 mice	Stock	F	0.3% in benzene twice weekly	Skin	11[11]	19 alive at 30 weeks	50 weeks
	38 mice	Stock	F	--do--[12]	--do--	10[11]	6 alive at 30 weeks	--do--
	39 mice	Stock	F castr.	0.3% in benzene twice weekly	--do--	19[11]	33 alive at 30 weeks	--do--
	38 mice	--do--	--do--	--do--[12]	--do--	12[11]	5 alive at 30 weeks	--do--
Teort and Teort, 1937	311 mice	---	---	---	Skin	101[13]	---	---
Urinson, 1937	45 mice	---	---	2 mg. in sunflower-seed oil, 3 to 4 doses	S.C.	9	33 killed early	18 weeks
	4 rabbits	---	---	20 mg. in sunflower-seed oil, 2 doses	--do--	0	---	17 mos.
Wolbach, 1937	Mice	---	---	9% in cholesterol	S.C.	0	---	---

1. Of the lung.
2. Also 4 lung tumors and one liver tumor.
3. Also 5 primary lung tumors.
4. Also one lung adenocarcinoma and hepatomas.
5. Of the lung; also one hepatoma.
6. Also lung and liver tumors.
7. By means of a needle down the esophagus.
8. In the majority of the animals.
9. First at 170 days.
10. First at Ca. 85 days.
11. Carcinoma of the skin, breast and uterus; myomas.
12. Plus 0.1% estrone in benzene.
13. Also benign tumors and hyperplasia.

801.--1,2,5,6-DIBENZANTHRACENE (Continued)

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Yudina, 1957	42 fowls	---	M & F	0.5% in chicken fat, 0.1 to 0.2 cc. every 6 days for 5 mos.	Inj.	2 sarc.[1]	Majority killed between 5 and 7 mos.	8 mos.
Andervont, 1938a	25 mice	Y	M & F	0.4% in lard, 0.2 cc., 2 injections	S.C.	21	4 died neg.	34 weeks
	36 mice	C3H	--do--	0.4% in lard, 0.2 cc.	--do--	35	1 died neg.	--do--
	17 mice	Y	--do--	--do--	--do--	0	8 died neg.	--do--
	--do--	C3H	M	--do--	--do--	15	2 died neg.	--do--
Andervont, 1938b	24 mice	ABC	M & F	1 mg. in lard	S.C.	20[2]	4 alive at 5½ mos.	Ca. 5½ mos.
	42 mice	BBC	M & F	--do--	S.C.	26[3]	16 alive at 5½ mos.	5½ mos.
	14 mice	C3H	--do--	--do--[4]	S.C.	11[5]	2 neg. alive at 10 mos.	10 mos.
Andervont, 1938c	15 mice	C3H	M	0.8 mg. in lard	S.C.	15[6]	---	45 weeks
	17 mice	C	F	--do--	S.C.	13[7]	---	--do--
	22 mice	I	F	--do--	S.C.	14[8]	---	--do--
	--do--	I	M	--do--	S.C.	8[9]	---	--do--
	11 mice	C	F	--do--	S.C.	8[9]	---	44 weeks
	20 mice	C	M	--do--	S.C.	16[10]	---	--do--
	22 mice	C57, black	F	--do--	S.C.	16[11]	---	--do--
	12 mice	--do--	M	--do--	S.C.	7[12]	---	--do--
	--do--	M	F	--do--	S.C.	9[13]	---	--do--
	11 mice	M	M	--do--	S.C.	10[14]	---	--do--
	12 mice	A	M	--do--	S.C.	8[15]	---	--do--
	45 mice	C57, black	F	--do--	S.C.	32[13]	---	42 weeks
	42 mice	--do--	M	--do--	S.C.	33[16]	---	--do--
Andervont, 1938d	28 mice	C3H	F	--do--	S.C.	22[17]	---	38 weeks
	11 mice	I	F	--do--	S.C.	7[18]	---	--do--
	9 mice	Y	F	--do--	S.C.	3[5]	---	--do--
	206 mice	Het.[19]	M & F	--do--	S.C.	151[20]	---	--do--
Brunschwig and Bissell, 1938	Rats	---	---	8 mg. in lard	Intra-medullary	0	20 alive at 6 mos.	12 mos.
Burrows and Boyland, 1938	4 rabbits	---	---	0.1% in emulsified olive oil, plus 0.05% aqueous colloidal soln.	S.C.	3[21]	1 died neg. in 99 days	1818 days
	--do--	---	---	Aqueous colloidal soln.[22]	S.C.	1[21]	3 died neg. in 99 days	1466 days
	--do--	---	---	Crystals of silicon dioxide; in emulsified olive oil; in aqueous colloidal soln.	S.C.	1[23]	3 died neg. in 1002 days	2198 days

1. Also one leukemia, 5 aleukemic myeloses and 3 erythroplastoses.
2. First tumor at 14 weeks. All animals had lung tumors.
3. Also 19 lung tumors.
4. Substance used was diberzanthracene-lard removed from other animals.
5. First tumor at 4 months.
6. ♀ of animals tumorous in about 18 weeks.
7. ♀ of animals tumorous in about 28 weeks. Lung tumors also obtained.
8. ♀ of animals tumorous in about 34 weeks. Lung tumors also obtained.
9. ♀ of animals tumorous in about 32 weeks. Lung tumors also obtained.
10. ♀ of animals tumorous in about 24 weeks. Lung tumors also obtained.
11. ♀ of animals tumorous in about 34 weeks.
12. ♀ of animals tumorous in about 20 weeks.
13. ♀ of animals tumorous in about 28 weeks.
14. ♀ of animals tumorous in about 26 weeks.
15. ♀ of animals tumorous in 26 weeks; other ♀ tumorous in 28 weeks.
16. ♀ of animals tumorous in 25 weeks.
17. ♀ of animals tumorous in 17 weeks. Lung tumors also obtained.
18. ♀ of animals tumorous in 35 weeks. Lung tumors also obtained.
19. Hybrids of C3H, I and Y.
20. ♀ of animals tumorous at about 29 weeks. Lung tumors also obtained.
21. Of the uterus.
22. Following crystals of silicon dioxide.
23. In a male animal.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
801.--1,2,5,6-DIBENZANTHRACENE (Continued)								
Burrows and Boyland, 1938 (Continued)	4 rabbits	---	---	Aqueous colloidal soln. 4 cc. twice weekly	---	0	3 died neg. in 951 days	959 days
	8 rabbits	---	F	In emulsified olive oil twice weekly	Vagina	4	3 died neg. in 836 days	1868 days
	12 rabbits	---	F	In emulsified olive oil, 0.1 to 1 cc. twice weekly	Mammary ducts	2	9 died neg. in 1093 days	2116 days
	2 rabbits	---	---	0.5% in olive oil, 0.75 and 1 cc.	I.T.	0	1 died neg. in 1060 days	1238 days
Cornil, 1938	2 rats	---	---	1 mg. in lard	S.C.	0	---	80 days
Dobrovolskaia-Zavadskaia, 1938	236 mice	---	M	0.01 mg. in olive oil	S.C.	14 sarc., 1 epi.	27 alive neg. at 14-18 mos.	At least 18 mos.
	92 mice	---	F	--do--	S.C.	23[1]	9 alive neg. at 18 mos.	18 mos.
	136 mice	---	M	0.005 mg. in olive oil	S.C.	2 sarc.	17 alive neg. at 16 mos.	16 mos.
	228 mice	---	F	--do--	S.C.	41[2]	53 alive neg. at 13-16 mos.	16 mos.
	167 mice	---	M	0.025 mg. in olive oil	S.C.	2	115 alive neg. at 11 mos.	11 mos.
	158 mice	---	M	0.0012 mg. in olive oil	S.C.	0[3]	121 alive neg. at 7 mos.	7 mos.
Dobrovolskaia-Zavadskaia and Adamova, 1938a	57 mice	17 nc	M	0.005 to 0.1 mg. in olive oil or lard	S.C.	5	25 alive at 12 mos.	24 mos.
	88 mice	--do--	F	--do--	S.C.	21	30 alive at 12 mos.	21 mos.
	24 mice	39	M	--do--	S.C.	6	8 alive at 12 mos.	25 mos.
	47 mice	39	F	--do--	S.C.	15	20 alive at 12 mos.	25 mos.
	42 mice	41	M	--do--	S.C.	13	11 alive at 12 mos.	22 mos.
	55 mice	41	F	--do--	S.C.	16	7 alive at 12 mos.	--do--
	17 mice	42	M	--do--	S.C.	3	---	15 mos.
	15 mice	42	F	--do--	S.C.	5	---	14 mos.
Dobrovolskaia-Zavadskaia and Rouyer, 1938	102 mice	xxx	M & F	Very small dose	S.C.	10 sarc.[4]	76 died neg. in 2 years	Ca. 2 years
Furth and Furth,[5] 1938	102 mice	---	---	Colloidal aqueous soln. weekly, 1-9 injections	I.V.	Tumors[6]	---	At least 9 weeks
Goerner, 1938	16 rabbits	---	---	9 to 63 mg. in colloidal aqueous soln.	I.P.	0	---	59 days
	16 rabbits	---	---	6 to 30 mg. in colloidal aqueous soln.[7]	I.P.	0	---	3 weeks
Haddow, 1938c	12 rats	Lister	---	0.5% in sesame oil, 1 cc., 2 injections	Inj.	8[8]	---	8½ mos.

1. Adenocarcinoma and sarcoma at site of injection; and at other sites.
2. Sarcoma and adenocarcinoma.
3. Benign nodules in 2 animals.
4. Also generalized lymphadenomatosis in one animal and lymphosarcoma of the thymus in another.
5. See also under 1,2,5,6-dibenzanthracene-carbamido-casein.
6. Breast tumors; leukemia; one cystic hemangioma of the spleen.
7. Plus S.C. injections of Vitamin A.
8. First at 3 mos.

801.--1,2,5,6-DIBENZANTHRACENE (Continued)

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Larionova and Soboleva, 1958	10 mice	---	M & F	10 mg. (total dose) in food for 7 months	P.O.	3 pap.[1]	---	---
	--do--	---	--do--	19 mg. (total dose) in food for 5 months	P.O.	1 pap.[2] and 1 carc.[3]	---	---
Lewis, M. R., 1958a	Mice	C3H	---	0.8 mg. in olive oil	S.C.	1	---	At least 75 days
	--do--	--do--	---	--do--	Pleural cavity	1[4]	---	At least 115 days
	--do--	RA	---	--do--	S.C.	1	---	At least 237 days
Lewis, M. R., 1958b	75 mice	C3H and C57	---	--do--	S.C.	35	---	At least 214 days
McDonald, Jr. and Woodhouse, 1958	Mice	---	---	0.5% in lard, 0.5 cc., repeated injections	I.M.	Tumors	---	At least 10 mos.
Noble, 1958a	5 rats	Wistar	M	10 mg. crystals	S.C.	0	---	28 days
	5 rats	--do--	M	50 mg. crystals	S.C.	0	---	--do--
Orr, 1958	15 mice	Stock	---	0.3% in benzene weekly	Skin	Tumors	---	18 weeks
	15 mice	--do--	---	Saturated solution in acetone weekly	--do--	--do--	---	--do--
Orr and Polson, 1958	1 rabbit	---	F	0.4% in lard, 0.5 cc.	Thyroid	1[5]	---	3½ years
	--do--	---	F	0.4% in lard, 2.5 cc.	Kidney	1[5]	---	Over 4 years
Schabad, 1958a	Mice	---	---	In benzene	Skin	Tumors[6]	---	Over 6 mos.
	--do--	---	---	In oil of litmus	S.C.	--do--[7]	---	---
	--do--	---	---	--do--	I.P.	--do--[8]	---	---
Schabad and Grinson, 1958	25 guinea pigs	---	M & F	8 to 50 mg. in sunflower-seed oil, 2-4 injections	I.P.	2[9]	7 alive at 19 mos.[10]	At least 22 mos.
Bell, 1958a	6 rats	Stock	M & F	0.5 to 1% in lard	Brain	1[11]	---	229 days
Bell, 1958b	Rats	--do--	--do--	In lard, or mixed with crystalline cholesterol	--do--	1 carc.[12]	---	---
Yudina, 1958a	20 mice	---	---	1 mg. in chicken fat, every 6 days, 9 injections	S.C.	13 sarc.[13]	7 died early	Over 4½ mos.
Andervont[14]	35 mice	C3H	---	0.05 mg. in horse serum	Intracerebral	0	9 alive at 13 mos.	13 mos.
Andervont, 1959a	26 mice	A	M	0.5 mg. in dog serum, 3 injections	I.V.	26[15]	---	3-15 mos.

1. Of the stomach. First at 14 mos., also one with a lung adenoma, breast adenoma, and sebaceous gland adenoma.
2. Of the stomach in 14 mos.
3. Of the forestomach; also had stomach papillomas and lung adenocarcinoma and metastases to diaphragm and lymph nodes.
4. Tumors developed from thymus gland.
5. Of the uterus.
6. Of the lung in 22.5% of animals (or 36.2% of those alive at 6 mos.).
7. Of the lung in 27-59% of animals.
8. Of the lung in over 59% of animals.
9. One fibrosarcoma at 19 months; one malignant lipoma at 22 mos.
10. Of the 18 animals dead, 15 had ascites, liver cirrhosis, etc.
11. And 6 granulomas.
12. From solution in lard.
13. 4 appeared in 4½ mos. Tumors were accompanied by myelogenous leukemia.
14. Unpublished results cited by Seligman et al., 1939.
15. Of the lung.

801.--1,2,5,6-DIBENZANTHRACENE (Continued)

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Andervont, 1939a (Continued)	16 mice	C3H	M	0.3 mg. in dog serum, 5 injections	I.V.	4[1]	---	44-10 mos.
	27 mice	C3H	F	1 mg. in horse serum	S.C.	Tumors[2]	---	47 weeks
	10 mice	--do--	F	0.5 mg. in dog serum, 2 injections	S.C.	3[3]	---	59 weeks
	31 mice	--do--	F	0.5 mg. in horse serum	I.V.	4[4]	---	30 weeks
	10 mice	--do--	F	--do--	S.C.	9[5]	---	9 mos.
	11 mice	--do--	F	1 mg. in horse serum	S.C.	9[6]	---	9 mos.
	10 mice	--do--	M	--do--	S.C.	7[6]	---	9 mos.
	15 mice	--do--	M	--do--	I.V.	Tumors[7]	2 died early	9 mos.
	28 mice	--do--	F	0.5 mg. in horse serum, 2 injections	I.V.	27[8]	---	6 mos.
Andervont, 1939b	164 mice	A	---	0.8 mg.[9]	S.C.	86[10]	Several killed early	10 weeks
	36 mice	A	---	0.2 mg.[9]	I.V.	20[11]	--do--	9 weeks
	55 mice	A	---	0.5 or 1 mg.[9]	I.V.	34[12]	--do--	10 weeks
Andervont, 1939c	36 mice	A	M	0.9 mg. (total dose) in horse serum	I.V.	Tumors[12]	---	45 weeks
	20 mice	D	F	--do--	I.V.	7[13]	---	45 weeks
	9 mice	C57, brown	F	0.6 mg. in horse serum (total dose)	S.C.	5[13]	---	57 weeks
	9 mice	C57, black	F	--do--	S.C.	2[13]	---	52 weeks
	5 mice	A	F	0.5 mg. on charcoal suspended in saline	I.V.	4[13]	All alive at 26 weeks	--do--
	10 mice	C3H	F	--do--	I.V.	9[13]	--do--	52 weeks
	12 mice	C57, brown	F	--do--	I.V.	2[13]	--do--	--do--
	11 mice	D	F	--do--	I.V.	0	--do--	36 weeks
	13 mice	C57, black	F	--do--	I.V.	0	--do--	52 weeks
	12 mice	C	F	--do--	I.V.	7[13]	--do--	--do--
	8 mice	M	F	--do--	I.V.	0	--do--	--do--
	10 mice	Het[14]	---	1 mg. in horse serum	I.V.	9[13]	---	9 mos.
	8 mice	C57, black	F	0.5 mg. in horse serum	I.V.	4[13]	---	38 weeks
Banting, 1939	12 fowls	Barred Rock	---	5 mg. in lard every 2 weeks	I.M. breast	6	---	---
	--do--	--do--	---	--do--	--do--	8	1 died neg. in 4 mos.	At least 4 mos.
Baumann et al., 1939	100 mice	C	---	0.5% in corn oil, 0.25 cc.	S.C.	Tumors[15]	---	5 mos.
Chernyeva, 1939	Fowls	---	F	0.2 cc. every 6 days for 5 months	S.C.	Tumors	---	6 mos.
Cesto et al., 1939	20 rabbits	---	---	0.3% in benzene, 1 or 2 cc. every 10 or 20 days	Inj.	0	---	12 mos.
Dobrovolskaia-Zavadskaia and Adamova, 1939	166 mice	RIII	M	0.0025 to 0.1 mg.	S.C.	55 sarc.[16]	120 died neg.	Up to 19 mos.
	93 mice	--do--	F	--do--	--do--	17 sarc.[17]	29 died neg.	Up to 21 mos.
	12 mice	RIII	F	0.1% in lard	Vagina	0[18]	---	Up to 14 mos.

1. Of the lung. Also one liver tumor.
2. Several spontaneous and induced breast tumors.
3. Also 7 lung tumors.
4. Of the lung. All animals developed breast tumors.
5. Also 4 lung tumors.
6. Also 6 lung tumors.
7. 15 lung tumors; 5 liver tumors.
8. Of the lung; many breast tumors obtained.
9. Solvents used: lard, horse serum, lard emulsion in water, mousefat emulsion, in water, and lard emulsion in serum.
10. Of the lung; first tumor at 4 weeks.
11. Of the lung; first at 5 weeks.
12. Of the lung. All animals alive at 15 weeks.
13. Of the lung.
14. C57 black and D,hybrid.
15. 40-85% of the "effective total."
16. Metastases to heart, etc. Also 2 epitheliomas (at site), lymphosarcoma, lymphadenoma of the thymus, one angioma of the epididymis.
17. Also 55 mammary carcinomas (15 near site), 4 other mammary tumors, one epithelioma. Metastases described.
18. In 3 animals, precancerous changes at site; also 9 mammary carcinomas and one epithelioma.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
801.--1,2,5,6-DIBENZANTHRACENE (Continued)								
Duran-Reynals, 1959	214 frogs	Rana pipiens, R. clamitans, R. catesbiana	---	0.125 to 4 mg. in lard, or colloidal suspension in gelatin or horse serum	I.M.	0	151 died in 1 mo.	7 mos.
	18 newts	Triturus viridescens, T. viridescens	---	2 mg. in lard	--do--	0	All dead in 3 mos.	3 mos.
Geschickter, 1959	14 rats	---	M & F	2.6-5.0 mg. pellets	Mammary gland	14[1]	---	At least 418 days
Goerner and Goerner, 1959a	50 rats	---	---	1 mg. in colloidal aqueous solution, 3 times weekly	I.P.	0	---	12 weeks
	15 rabbits	---	---	5.55 mg. in colloidal aqueous solution, 3 times weekly	I.P.	0	---	7.5 weeks
Goerner and Goerner, 1959c	56 rats	---	---	5 mg. in colloidal solution in aqueous gelatin weekly	I.P.	0	---	Several weeks
	18 rabbits	---	---	10 mg. in colloidal solution in aqueous gelatin weekly	I.P.	0	---	--do--
	Rats	---	---	5 mg. in colloidal solution in aqueous gelatin weekly	I.P.	0	---	3 mos.
de Haas, 1959	9 mice	DBA	F	Repeated injections	S.C.	9	---	---
Lewis, M. R., 1959	Mice	C57	---	0.8 mg. in olive oil	I.P.	1[2]	---	At least 411 days
Lewis, M. R., 1959	Mice	BA	---	0.8 mg. in lard or olive oil	I.P.	24	---	At least 183 days
Magnus, 1959	100 mice	Stock	F	0.4% in olive oil, 0.5 cc. twice weekly for 6 mos.	Stomach[3]	60[4]	63 alive at 8 mos.	20 mos.
McIntosh and Selbie, 1959	9 fowls	Plymouth Rock	---	0.4% in lard 0.5 cc., 4 injections	Inj.	3[5]	3 alive at 56 days	At least 90 days
Noble, 1959b	5 rats	Albar	M	10 mg. crystals	S.C.	0	---	4 weeks
Orr, 1959	30 mice	---	M & F	5 mg. in paraffin	S.C.[6]	0[7]	Majority killed for histological purposes[8]	387 days
Peers, 1959	81 mice	Stock	M & F	0.072 mg. in cholesterol	Inj. brain	1	48 alive at 8 mos.	At least 8 mos.
	1 mouse	--do--	---	5% in suspension in lard, 0.1 cc.	--do--	0	---	---
Van Prohaska et al., 1959	Mice	---	---	In lard	P.O.	0	---	6 mos.

1. Fibrusarcoma, between 325 and 418 days.
2. A monocytoma of the spleen.
3. By means of a needle down the esophagus.
4. Of the lung first at 8 months. Of the 3 animals without lung tumors one had sarcoma of the diaphragm.
5. Appearing between 62 and 90 days.
6. At another site a pellet of 1,2,3,4-dibenzanthracene was introduced.
7. 4 tumors at another site.
8. See Bonser and Orr, 1959.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
801.--1,2,5,6-DIBENZANTHRACENE (Continued)								
Shear and Lorenz, 1939	46 mice	Stock	---	5% in cholesterol	S.C.	17	5 alive at 11 mos.	13 mos.
	12 mice	A	F	1% in cholesterol	S.C.	2		
	14 mice	A	F	0.1% in cholesterol	S.C.	0	49 alive at 12 mos.	18 mos.
	18 mice	A	F	0.01% in cholesterol	S.C.	0		
	18 mice	A	F	0.001% in cholesterol	S.C.	1		
Shabad and Kleinerberg, 1934	Mice	PB	---	---	---	25-38%[1]	---	---
Shimkin, 1939a	10 mice	A	F & M	0.1 mg. in horse serum plus cholesterol	I.T.	9[2]	---	5 mos.
	11 mice	A	M & F	0.1 mg. on charcoal in saline	I.T.	7[2]	---	--do--
	10 mice	A	--do--	--do--	I.V.	6[2]	---	--do--
Stewart, 1939b	49 mice	C3H	M, castr.	0.8 mg. in lard	S.C.	39	---	41 weeks
	21 mice	C3H	M	--do--	S.C.	18	---	--do--
	33 mice	C3H	F, castr.	--do--	S.C.	30	---	--do--
	18 mice	C3H	F	--do--	S.C.	17	---	--do--
Sutro and Pomerantz, 1939a	35 rats	---	---	3 mg. in benzene or in lard, 1 to 6 injections	inj.[3]	16	---	7 to 23 mos.
	Less than 19 rats	---	---	3 mg. in benzene or in lard	S.C.	0	---	270 days
Turner, 1939b	15 mice	D	M	10 mg. crystals	S.C.	12	13 alive at 4 mos.	18 mos.
	20 mice	C3H	M	1 mg. in lard	S.C.	18	All alive at 5 mos.	At least 36 weeks
Twort and Twort, 1939	100 mice	---	---	0.2% in chloroform	Skin	45	---	40 weeks
	--do--	---	---	0.1% in chloroform	--do--	41	---	--do--
	--do--	---	---	0.05% in chloroform	--do--	34	---	--do--
	Mice	---	---	in oleic acid	--do--	Tumors[4]	---	---
	100 mice	---	---	0.05% in chloroform	--do--	10	62 alive at 35 weeks	35 weeks
	100 mice	---	---	0.05% in oleic acid	--do--	2	60 alive at 35 weeks	--do--
	--do--	---	---	0.05% in mineral oil	--do--	1	13 alive at 35 weeks	--do--
	--do--	---	---	0.05% in liquid paraffin	--do--	0	21 alive at 35 weeks	--do--
	--do--	---	---	0.1% in butyric acid[5]	--do--	1	8 alive at 40 weeks	40 weeks
Wolfe and Bryan, 1939	25 rats	---	♀[6]	5 mg.[7] in sesame oil daily	---	0	---	18 days
Andervont and Shimkin, 1940	12 mice	A	---	0.25 mg. in aqueous suspension, single injection	I.V.	12[8]	---	20 weeks

1. Lung adenomas as against 5-8% in controls.
2. Of the lung.
3. Into pericranial tissues, spinous process of lower lumbar vertebra, region of knee joint, marrow cavity of tibia, dorsal aspect of scapula.
4. Fewer tumors than with chloroform as solvent.
5. Very incomplete data are given for experiments with mixtures of solvents.
6. Pregnant.
7. Yellow grade of substance used.
8. Of the lung; first within 8 weeks.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
801.--1,2,5,6-DIBENZANTHRACENE (Continued)								
Andervont and Shimkin, 1940 (Continued)	10 mice	A	M & F	0.5 mg. in tricaprylin	S.C.	0 sarc.[1]	---	14 weeks
	20 mice[2]	A	---	0.2 mg. in sesame oil	S.C.	16 sarc.[3]	---	40 weeks
Andervont, 1940	223	Hybrid[4]	---	0.8 mg. in lard	S.C.	181 sarc.[5]	---	48 weeks
Crabtree, 1940a	40 mice	---	---	0.2% in acetone and 2% liquid paraffin twice weekly	Skin	31 pap.[6]	31 alive at 27 weeks	27 weeks
	--do--	---	---	0.2% in benzene twice weekly	--do--	12 pap.[7]	30 alive at 27 weeks	--do--
Crabtree, 1940b	40 mice	Stock	---	0.2% in acetone and 2% liquid paraffin twice weekly	Skin	30	31 alive at 30 weeks	30 weeks
Dobrovolskaia-Zavadskaia, 1940	445 mice[8]	---	M & F	---	S.C.	Tumors[9]	---	---
	Mice[10]	---	F	---	--do--	62 mamm. carc.	---	---
Grady and Stewart, 1940a	100 mice	A	M & F	0.8 mg. in lard	S.C.	Tumors[11]	Many killed early for histological purposes	11 weeks
Grady and Stewart, 1940b	100 mice	A	M & F	--do--	--do--	--do--		3 mos.
Haerem, 1940	20 mice	Swiss	---	15 mg. in lard twice	S.C.	8 sarc.	---	At least 200 days
Heston, 1940	113 mice	A	---	1 mg. in olive oil	S.C.	113[12]	---	169 days
	97 mice	L	---	--do--	--do--	0	---	--do--
	--do--	N	---	--do--	--do--	7[12]	---	--do--
	98 mice	R	---	--do--	--do--	31[12]	---	--do--
	722	Hybrid[13]	---	--do--	--do--	440[12]	---	--do--
Hoch-Ligeti, 1940	5 rabbits	---	---	0.05% aq. gelatine soln., 5 cc. every 1-3 weeks in 1 month	S.C.	0	1 died in 1 month	300 days
Jacobi and Baumann, 1940	12 mice[2]	C or albino	---	0.3% soln., 3 times weekly[14]	Skin	Tumors[15]	---	At least 9 mos.
	9 mice[2]	--do--	---	0.3% soln., 3 times weekly	--do--	Tumors[16]	---	--do--
Kroteova, 1940	39 mice	---	F	2-5 mg. in sunflower-seed oil, 1-2 times	S.C.	Sarc.[17]	---	12 mos.

1. But all had lung tumors.
2. Effective total.
3. 10 examined had lung tumors.
4. C3H, I and Y.
5. Also 146 with lung tumors.
6. First at 12 weeks; induction time 19 weeks.
7. First at 16 weeks.
8. Noncancerous strains.
9. Mammary adenocarcinoma, 19.3% in males, 26% in females.
10. Cancerous strains.
11. First at 36 days; also subcutaneous tumors.
12. Of the lung.
13. Various crosses of A, L, N and R.
14. Animals fed on diet containing Crisco.
15. ½ of animals tumorous in 4.5 months.
16. ½ of animals tumorous in 9 months.
17. Also lung tumors; sebaceous adenoma of skin and breast tumors. Alterations in ovaries.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
801.--1,2,5,6-DIBENZANTHRACENE (Continued)								
Lee, 1960	Mice	Caracul	♀[1]	0.48 in olive oil; 0.5 minim,	Amniotic fluid of embryos	19[2]	---	155-233 days[3]
	Mice	Hybrid[4]	M & F	--do--	I.P.	24[5]	24 alive at avg. of 180 days	Avg. of 180 days
	Mice	--do--[6]	--do--	--do--	I.P.	2[7]	29 alive at avg. of 129 days	Avg. of 129 days
Levine and Bergmann, 1960	10 mice	Inbred	M & F	0.2 mg. in olive oil weekly	S.C.	7[8]	---	10 mos.
	--do--	--do--	--do--	0.2 mg. in olive oil	S.C.	--do--	---	--do--
Lewis, M. R., 1960	Mice	A, BA, C3H, C57 (bl)	---	0.6 mg. in 0.4 cc. lard or olive oil	S.C.	280 sarc.	---	---
Lorenz, E. and Andervont, 1960	9 mice[9]	A	---	0.6 mg. in lard	S.C.	8[10]	---	5 mos
	34 mice[9]	A, hybrid	---	--do--	--do--	34[10]	---	--do--
	5 mice	A	---	--do--	--do--	5[10]	---	--do--
	25 mice	A, hybrid	---	--do--	--do--	23[10]	---	--do--
Lorenz, E. and Stewart, 1960a	9 mice	A, backcross	M	Avg. 0.72 mg. daily in olive oil emulsion	P.O.	0[11]	---	9 mos.
	10 mice	--do--	M	Avg. 0.5 mg. per day in olive oil emulsion	--do--	0	---	13 mos.
	--do--	A	M	Avg. 0.6 mg. per day in olive oil emulsion	--do--	1 carc.[12]	---	8 mos.
	--do--	A	M	Avg. 0.64 mg. daily in olive oil emulsion	--do--	5 carc.[12]	---	10 mos.
	--do--	A	F	Avg. 0.66 mg. daily in olive oil emulsion	--do--	1 carc.[12]	---	9 mos.
	--do--[13]	A, backcross	M	Avg. 0.80 mg. daily in olive oil emulsion	--do--	0	---	8 mos.
	--do--[13]	--do--	M	Avg. 0.84 mg. daily in olive oil emulsion	--do--	0	---	--do--
	--do--[13]	--do--	M	Avg. 0.60 mg. daily in olive oil emulsion	--do--	0	---	7 mos.
Lorenz, E. and Stewart, 1960b	Mice	A, C57-br., C57-bl., C3H, A, backcross	---	In aqueous olive oil emulsion	P.O.	0	---	7 mos.
	Mice	A, backcross	---	In aqueous mineral oil emulsion	P.O.	0	---	--do--
Pullia, 1960	61 mice	Albino	---	Soln. in water, benzene and sesame oil	Skin	Tumors[14]	---	At least 155 days
Rusch et al., 1960	9 rats	Stock	---	1.25-2.62 mg. (total dose) in corn oil	Liver	0	---	17 mos.
	--do--	--do--	---	1-4 mg. (total dose) in corn oil	Spleen	0	---	--do--
	13 rats	--do--	---	1-5 mg. (total dose) in corn oil	Testis	0	---	--do--
	6 rats	--do--	---	1 mg. (total dose) in corn oil	Epididymis	0	---	15 mos.
	5 rats	--do--	---	1-1.5 mg. (total dose) in corn oil	Sub-maxill. gland	2 sarc.	---	16 mos.
	5 rats	--do--	---	1.75-7.25 mg. (total dose) in corn oil	Bone marrow	1 sarc.	---	13 mos.
	5 mice	C3H	---	0.25 mg. (total dose) in corn oil	Liver	0	---	14 mos.
	2 mice	--do--	---	--do--	Spleen	1 sarc.	---	6 mos.
Sell and Shear, 1960	20 mice	A	M	0.1 mg. in lard	S.C.	9	12 alive neg. at 9 mos.	17 mos.

1. Pregnant bred to F stock males; 25 young born alive and lived to maturity.
2. Lung carcinoma; also one liver carcinoma and one fibrosarcoma.
3. Age of young.
4. F_1 of Caracul and F mice 24 hours old.
5. Lung carcinoma; also 2 fibrosarcomas.
6. F_1 of Caracul and F mice 2 months old.
7. Lung carcinoma.
8. First at 5 months.
9. Born and raised in dust free air.
10. Of the lung.
11. All animals in this paper developed lung tumors.
12. Of small intestine.
13. Received also repeated S.C. injections of testosterone propionate.
14. In all surviving 152-155 days. Tumors are malignant.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
801.--1,2,5,6-DIBENZANTHRACENE (Continued)								
Shear and Ilfeld, 1940	20 mice	D	---	5% in cholesterol pellets (weighing 7-60 mg.)	S.C.	3 sarc.[1]	7 alive at 11 mos.	11 mos.
	--do--	D	---	1% in cholesterol	--do--	1 sarc.	3 alive at 11 mos.	--do--
	10 mice	D	---	0.1% in cholesterol	--do--	0	--do--	--do--
	--do--	D	---	0.01% in cholesterol	--do--	0	--do--	--do--
	--do--	D	---	0.001% in cholesterol	--do--	0[2]	--do--	--do--
Shimkin, 1940b	41 mice	A	---	0.5 mg. in horse serum	I.V.	23[3]	10 killed at 3 weeks	6 weeks
	30 mice	A	---	0.5 mg. in horse serum-cholesterol	S.C.	7[4]	17 killed at 4 weeks	--do--
	10 mice	A	---	0.25 mg. in lard	--do--	7[5]	---	3 weeks
	--do--	A	---	0.5 mg. in lard	--do--	10[5]	---	--do--
	--do--	A	---	1.0 mg. in lard	--do--	10[5]	---	--do--
Shimkin and Andervont, 1940a	19 mice	C3H	M	0.25 mg. in tricaprylin	S.C.	17	---	32 weeks
	20 mice	--do--	M	0.5 mg. in tricaprylin	--do--	18[6]	---	30 weeks
	20 mice	--do--	M	1.0 mg. in tricaprylin	--do--	19	---	29 weeks
	18 mice	--do--	M	2.0 mg. in tricaprylin	--do--	17	---	28 weeks
	16 mice	--do--	M	3.0 mg. in tricaprylin	--do--	15[7]	---	21 weeks
	32 mice	--do--	M	0.125 mg. in tricaprylin	--do--	29[8]	---	33 weeks
	15 mice	Stock	M & F	0.25 mg. in tricaprylin	--do--	2	High mortality	40 weeks
	16 mice	--do--	--do--	0.5 mg. in tricaprylin	--do--	2[9]	--do--	--do--
	20 mice	--do--	--do--	1.0 mg. in tricaprylin	--do--	6	--do--	--do--
	16 mice	--do--	--do--	2.0 mg. in tricaprylin	--do--	4	--do--	--do--
Shimkin and Andervont, 1940b	43 mice	C3H	---	0.8 mg. in mouse fat (strain A)	S.C.	32[10]	---	24 weeks
	15 mice	--do--	---	0.8 mg. in lard	--do--	15[11]	---	--do--
Baumann et al., 1941	6 rats	---	---	1 mg. in coll. susp. in aq. gelatin soln. 3 times weekly	I.P.	0	---	10 weeks
	--do--	---	---	1 mg. in coll. susp. in aq. gelatin soln. weekly	I.P.	0	---	--do--
	7 rats	---	---	--do--	I.P.	0	---	6½ weeks
	--do--	---	---	--do--	--do--	0	---	8 weeks
	Rats	---	---	1 mg. in coll. susp. in aq. gelatin soln. every 2 weeks	--do--	0	---	--do--
	10 rats	---	---	4 mg. in lard, repeated injections	S.C.	Tumors	---	At least 19 weeks
Berenblum, 1941b	36 mice	---	---	Saturated soln. in acetone weekly	Skin	5[12]	33 alive at 20 weeks	At least 28 weeks
Boyland et al., 1941	Rabbits	---	---	0.16% in food	P.O.	0[13]	---	Several mos.
	Rats	---	---	in food	P.O.	0	All died in 6-10 weeks	10 weeks
Bradbury et al., 1941	12 mice	Inbred	---	3 mg. in sesame oil	S.C.	7 sarc.	4 neg. alive at 7 mos.	7 mos.

1. Also 4 mammary gland tumors.
2. One mammary gland tumor.
3. Of lungs, first at 5 weeks.
4. Of the lung, first at 4 weeks.
5. Of the lung.
6. First at 15 weeks.
7. First at 12 weeks.
8. First at 14 weeks.
9. First at 17 weeks.
10. Average latent period 18.5 weeks.
11. Average latent period 17.8 weeks.
12. At 20 weeks; first at 12 weeks.
13. Cirrhosis of the liver, generally.

801.--1,2,5,6-DIBENZANTHRACENE (Continued)

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Davis et al., 1941	37 rats	---	M & F	0.4% in lard, 0.5-1.0 cc., 3 or 4 times	S.C.	10 sarc.[1]	12 alive at 100 days	Over 236 days
Fedotov, 1941	Axolotl	---	---	In coagulated egg albumin	S.C.	0[2]	---	14 mos.
Franseen, 1941b	10 mice	C3H	---	5% cholesterol pellet	Thyroid	0	Died of infection	---
	12 mice	C3H	---	--do--	Thymus	0	--do--	---
	8 rats	---	---	--do--	--do--	0	---	---
	10 mice	C3H	M	--do--	Testis	0	---	6 mos.
	5 mice	A	M	50% cholesterol pellet	--do--	0	---	--do--
	10 mice	C3H	---	5% cholesterol pellet	Pancreas	0	---	6½ mos.
Hoch-Ligeti, 1941	1 rabbit	---	---	0.05% in colloidal of aq. gelatin soln. 5 cc. every 4-8 weeks	S.C.	0	---	At least 1.5 years
Law, 1941a	20 mice	C	---	0.5% in benzene twice weekly	Skin	0[3]	---	---
	45 mice	C	---	0.8 mg. in olive oil	S.C.	34 sarc.[3]	---	Over 253 days
Lorenz, E. et al., 1941	20 mice	C3H	M	0.25% dispersion in Aerosol O.T. soln. 0.1 or 0.2 cc.	S.C.	16	---	53 weeks
Lorenz, E. and Stewart, 1941	Mice	C57 br., C57 bl., C3H, Dba	---	In olive oil emulsion	P.O.	0[4]	---	---
Lynch, 1941	Mice	Swiss-8 Bagg 1194	---	0.5 minim of 0.4% soln.	I.P.	0[5]	---	---
Matolcsy, 1941	Rats	---	---	Crystals	Artificial anus	0	---	At least 8 mos.
	5 rats	---	---	Crystals	S.C.	2 sarc.	---	At least 8 mos.
Murphy and Sturm, 1941a	10 rats	Wistar	---	3.0% in benzene, 0.5 cc., 2 injections	Groin	2 sarc.[6]	---	---
Murphy and Sturm, 1941b	21 fowls	Plymouth Rock & R.I. Red	---	0.4% in lard, 0.15-1.2 cc., 4 times	I.M. breast	5[7]	---	67 weeks
	53 fowls	Plymouth Rock	F	24 mg. in benzene susp.	--do--	48[8]	---	At least 13 weeks
	9 fowls	---	---	24 mg. in benzene susp.	--do--	8[9]	---	Over 4 weeks
	5 fowls	---	---	24 mg. in lard	--do--	3[10]	---	Over 5 weeks
	10 fowls	---	---	24 mg. in chicken fat	--do--	1[11]	---	Over 9 weeks
Owen, 1941	Mice	C3H	---	0.25 mg.	Inj.	Tumors[12]	---	---
Peredelsky, 1941	12 axolotls	---	---	2.3 mg. per cc. of coagulated egg albumin or paraffin oil	S.C.	2[13]	---	100 days

1. First at 102 days.
2. A typical epithelial proliferation.
3. One myeloid hyperplasia.
4. Adenocarcinoma of the small intestine.
5. Of the lung.
6. Also one typical lymphatic leukemia.
7. First at 18 weeks, all metastasizing.
8. Average time of appearance 5½ weeks; metastases after 7 weeks.
9. Average time of appearance 4 weeks.
10. Average time of appearance 5 weeks.
11. Average time of appearance 9 weeks.
12. Nearly 100%.
13. Also 2 tumors in 7 animals with egg albumin alone, and 0 tumors out of 6 with paraffin oil alone.

801.--1,2,5,6-DIBENZANTHRACENE (Continued)

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Feyrter and Samsonoff, 1941	1 rat	White	---	2 mg. in 10 cc. paraffin oil, single injection	Testis	Tumor	---	11 mos.
Pollia, 1941	5 rats	Wistar	---	5 mg. in sesame oil weekly	S.C.	2[1]	---	10 mos.
Shear et al., 1941	8 mice	C57 bl.	M	Thread coated with dibenzanthracene	Liver	1[2]	---	16 mos.
Shinkin, 1941a	26 mice[3]	C3H	M	0.5 mg. in tricaprylin (M.P. 267.2-267.4° Corr.)	S.C.	26	All died in 26 weeks	26 weeks
	--do--	--do--	M	0.1 mg. in tricaprylin	S.C.	22	All died in 38 weeks	38 weeks
Stewart[4]	6 mice	C3H	M	Thread	Testis	0	---	12-20 mos.
Warren and Gates, 1941	30 guinea pigs[5]	---	---	In lard, repeated injections	S.C.	0	Few lived over 100 days	At least 142 days
	6 guinea pigs[6]	---	---	--do--	S.C.	0	--do--	---
	12 guinea pigs	---	---	5 mg. in cholesterol	S.C.	0	---	15 mos.
	44 guinea pigs	---	---	Ca. 1 mg. impregnated into woolen yarn	S.C.	0	---	4 mos.
Abels et al., 1942	101 rats	Sherman	M	3 or 5 mg. in aq. emulsion weekly	I.P.	0	---	12 weeks
Baumann et al., 1942	Rats	---	---	1 mg. in colloidal soln. in 1% gelatin,[7] weekly	I.P.	0	---	Up to 9 weeks
	Rats	---	---	1 mg. in oil weekly	S.C.	0	---	9 weeks
Carruthers, 1942	6 mice	Swiss	---	0.3 mg. in lard biweekly	I.P.	0	---	8 weeks
Dobriner et al., 1942	11 mice	Inbred	---	4 mg. (total) in lard in 3 injections	Inj.	11 sarc.	---	240 days
Green, 1942	Mice	Swiss	---	5.4 mg. in lard (total dose)	S.C.	Tumors[8]	---	54 days
	--do--	--do--	---	2.4 mg. in lard or commercial vegetable oil (total dose)	S.C.	--do--	---	--do--
Jones, 1942	2 rats	---	M & F	20 mg. in olive oil weekly	S.C.	0	---	8 weeks
Kirschbaum and Strong, 1942	13 mice	---	F	0.3% in benzene twice weekly	Skin	7[9]	---	At least 375 days
Lasnitzki and Woodhouse, 1942	Rats	---	M	0.278 mg. in coll. aq. soln., 5 times weekly	S.C.	0	---	Ca. 4 weeks
Roussy et al., 1942d	10 rats	---	M & F	1 mg. in olive oil	S.C.	6	---	Ca. 21 mos.
	--do--	---	--do--	0.1 mg. in olive oil	S.C.	3	---	Ca. 15 mos.
Rhoads, 1942	12 mice	Inbred	---	4 mg. in oil	Inj.	12	---	---

1. First at 8 months.
2. Adenocarcinoma.
3. Corrected for extraneous mortality during experiment.
4. Unpublished results cited by Shear et al., 1941.
5. On a scorbutic diet.
6. Adequate diet.
7. Different diets.
8. 100%.
9. Carcinomas and papillomas, first at 200 days. No leukemia before 300 days; latent period about 375 days.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
801.--1,2,5,6-DIBENZANTHRACENE (Continued)								
Roussy et al., 1942a	10 rats	---	---	1 mg. in olive oil	S.C.	6	---	Over 16-1/3 mos.
	9 rats	---	---	0.1 mg. in olive oil	S.C.	3	---	Over 11-1/3 mos.
Shimkin and Lorenz, 1942	57 mice[1]	A	---	0.1 mg.[2] in horse serum-cholesterol	I.V. tail	53[3]	---	12 weeks
	70 mice[4]	A	---	--do--	--do--	69[3]	---	--do--
	30 mice	A	M & F	--do--	--do--	30[3]	---	8-14 weeks
	29 mice[5]	A	M & F	--do--	--do--	29[3]	---	8-14 weeks
	20 mice	A	---	0.25 mg. in horse serum-cholesterol	--do--	20[3]	---	14-20 weeks
	30 mice	A	---	--do--[6]	--do--	30[3]	---	14-20 weeks
Smith, D. L., et al, 1942	10 rats[7]	Denver	M & F	10 mg. in paraffin (low-melting)	S.C.	Tumors[8]	---	Over 246 days
Steiner, 1942a	20 mice	---	M	1 mg. in cholesterol pellet	Sub-maxillary gland	9 carc.[9]	16 alive at 4 mos.	13-1/2 mos.
Steiner, 1942b	Mice	---	---	---	Salivary gland	---	---	---
Stewart and Lorenz, 1942	6 mice	C3H	M	0.5 mg. on thread	Pyloric stomach	1 sarc.	---	---
	12 mice	--do--	M	0.2 mg. in lard	--do--	12[10]	---	At least 17 mos.
Arnold and Zimmerman, 1943	21 mice	C3H	F	Pellets	Brain	5[11]	8 died neg.	---
Bryan and Shimkin, 1943	167 mice	C3H	M	0.062-8.0 mg.[12] in tricaprylin	S.C.	154[13]	---	Over 5.1 mos.
	21 mice	--do--	M	0.031 mg. in tricaprylin	S.C.	16	---	Over 6.3 mos.
	19 mice	--do--	M	0.0156 mg. in tricaprylin	S.C.	6	---	Over 5.9 mos.
	40 mice	--do--	M	0.0078 mg. in tricaprylin	S.C.	6	---	Over 8.8 mos.
	79 mice	--do--	M	0.00195 mg. in tricaprylin	S.C.	2	---	Over 9.5 mos.
Goerner and Goerner, 1943	96 rats	---	---	15 mg. in olive oil[14]	I.P.	0	---	100 days
Lapinsohn, 1943	6 mice	---	F	1 mg., dry	S.C.	5[15]	1 died early	68 days
	12 mice	---	F	5 mg. in lard	S.C.	0	2 died in 1 mo.	2 mos.
Lauridsen and Eggers, 1943	51 mice	C57, bl	M	0.4% in benzene twice weekly for 36 weeks	Skin	47[16]	---	300 days
	40 mice	C3H	M	--do--	--do--	20[16]	---	--do--
Lynch, 1943	448 mice	Swiss-B	---	0.5 minim. of a 0.4% solution in olive oil	I.P.	46.1%[17]	---	210 days
	1382 mice	Bagg	---	--do--	--do--	26.3%[18]	---	--do--
	2660 mice	1194	---	--do--	--do--	4.6%[19]	---	--do--

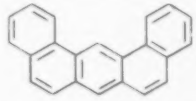
1. 11-12 months of age.
2. M.P. 266.0-266.8°, corr.
3. Of the lung.
4. 2 months of age.
5. Foster nursed.
6. Also injected with trypan blue.
7. Other animals administered estrone also.
8. Mean latent period 242 days.
9. First at 4 mos.
10. 4 adenomas, 4 mixed adenocarcinoma and sarcoma, 2 sarcomas, squamous papilloma; one squamous carcinoma.
11. 2 gliomas, 2 sarcomas and one carcinoma; also 8 extra-cranial sarcomas.
12. M.P. 267.3-267.7°.
13. For morphology and growth of these tumors see Shimkin and Bryan, 1943.
14. Some animals also given different amounts of Vitamin A.
15. First at 31 days.
16. Mammary carcinoma with a few sarcomas.
17. Of the lung, 1st at 3 mos.
18. Of the lung, 1st at 5 mos.
19. Of the lung, 1st at 11 mos.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
801.--1,2,5,6-DIBENZANTHRACENE (Continued)								
Stewart and Lorenz, 1943	Mice	C3H, A, C, C57 bl., I and dba	M & F	0.2-0.8 mg. in mineral oil, lard, horse serum, impregnated cotton thread	Stomach wall	Tumors[1]	---	---
Lacassagne et al., 1944b	10 mice	RIII	F	0.3% in a fatty ointment three times a week	Skin	Tumors[2]	---	263 days
Lasnitzki and Woodhouse, 1944	24 rats	Stock	M & F	1.0 cc. 0.27% mg. 5 days a week, 20-22 injections	S.C.	0	---	Several weeks
Shimkin and Bryan, 1944	317 mice	C3H	M	.00195-8 mg. in tricaprylin, single injection	S.C.	184 sarc.	---	At least 9 mos.
Cameron et al., 1945	Mice[3]	---	---	---	Skin	Tumors[4]	---	Ca. 2½ years
Crabtree, 1945	25 mice	---	---	0.2% plus 2% medicinal paraffin in acetone for 9 mos.	Skin	24[5]	None alive at 12 mos.	12 mos.
	--do--	---	---	0.2% plus 2% medicinal paraffin in acetone plus 4% maleic anhydride for 9 mos.	Skin	12[6]	19 alive at 12 mos.	12 mos.
Pfeiffer and Allen, 1945	6 monkeys	Macacus rhesus	---	18-450 mg. (total dose)	Inj., skin, I.V. or P.O.	0	---	½-8½ years
Puttinger, 1945	25 mice	Simpson	M	0.1% in acetone twice weekly	Skin[7]	16	alive at 9 mos.	9 mos.
Riley and Pettigrew, 1945	200 mice	Inbred	M	0.3% in acetone weekly for 16 weeks	Skin	0	---	At least 16 weeks
	93 mice	--do--	M	0.3% in acetone twice weekly for 33 weeks	Skin	Pap.	---	At least 75 weeks
Hecks, 1946	16 mice	CBA	---	0.01 mg. daily plus 0.1% croton oil in soap solution up to 90 weeks	P.O.	0	10 alive at 72 weeks	At least 94 weeks
Crabtree, 1946	Mice	Mc/H	---	12 mgm. in acetone, 14 times for 3 days[8]	Skin	Tumors	---	25-33 weeks
Lewis and King, 1946	267 rats	Varied	M & F	0.8-4 mg. in olive oil	S.C.	Sarc.	All lived	295 days
Murphy and Sturm, 1946	40 pigeons	Homing	---	In lard or olive oil, repeated injections over 14 mos.	I.M., breast	0	---	At least 14 mos.
	6 pigeons	Amer. Domestic Flight	---	5% suspension in benzene, 0.1 cc.	--do--	2 sarc.[9]	2 alive at 6 mos.	At least 6 mos.
	2 pigeons	Homing	---	--do--	--do--	0	All alive at 6 mos.	--do--
Carr, 1947a	Mice	C3H, CBA and RIII	M & F	0.1 cc. in saturated arachis oil	S.C.	0	---	At least 1 mo.

1. Of glandular stomach.
2. First at 105 days. 2 papillomas.
3. On different diets.
4. Most with skin carcinoma. Appearance of first tumor at 165-184 days.
5. First at 13½ weeks.
6. First at 24 weeks.
7. Skin excised from painted area.
8. Used also with benzene, naphthalene, phenanthrene and anthracene.
9. First at 7-8 mos.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
801.--1,2,5,6-DIBENZANTHRACENE (Continued)								
Elson and Harris, 1947	8 rats	Wistar	M	50 mg.[1]	I.P.	0	---	38-75 days
	7 rats	--do--	M	50 mg.[2]	I.P.	0	---	31-43 days
Elson and Warren, 1947	40 rats	---	---	25,50,75 and 100 mg. in arachis oil[3]	I.P.	0	---	Ca. 70 days
Locatelli, 1947	Rabbits	---	---	20 mg. in lard[4]	S.C.	0[5]	---	4 mos.
	Rats	---	---	--do--	S.C.	--do--	---	--do--
Orr, 1947b	18 mice	Stock	---	In almond oil	I.M.	1[6]	---	---
	433 mice	--do--	---	--do--	I.M.	191[7]	---	---
Shimkin and Wyman, 1947	235 mice	C3H	F	0.002 mg.-0.5 mg. in cholesterol pellets	S.C.	32 sarc.[8]	---	Ca. 24 mos.

802.--1,2,7,8-DIBENZANTHRACENE

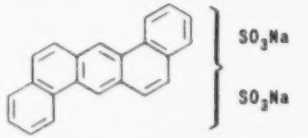


Kennaway, 1930[9]								
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	1 epi., 1 pap.	10 alive at 6 mos. 5 alive at 1 year	627 days
	--do--	--do--	---	--do--	--do--	2 pap.	11 alive at 6 mos. 2 alive at 1 year	722 days

803.--1,2,5,6-DIBENZANTHRACENE-CHOLEIC ACID[10]

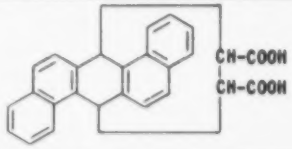
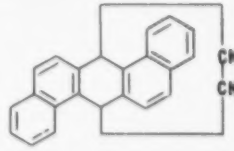
Shear and Leiter, 1941a**	29 mice	A	M & F	10 mg. crystals, 2 injections	S.C.	8[11]	19 neg. alive at 5 mos.	9 mos.
	24 mice	dba and A	M	1.25 mg. in aqueous solution as sodium salt, 5 injections	S.C.	2[12]	7 alive at 1 year	16 mos.

804.--1,2,5,6-DIBENZANTHRACENE-DISULFONIC ACIDS, SODIUM SALTS

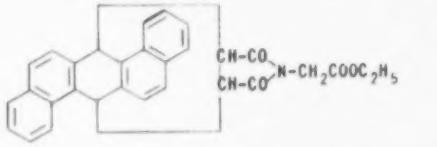
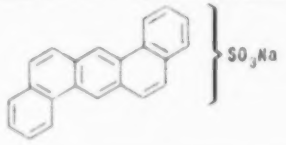
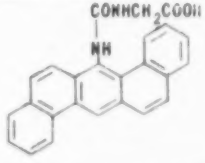
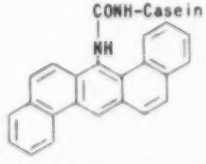


Barry et al., 1935	Mice	---	---	---	Skin	0	---	---

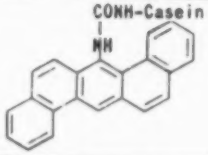
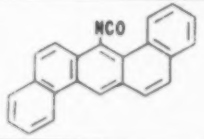
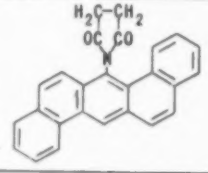
1. 5% protein diet.
2. 20% protein diet.
3. Diet experiment. Animals given also anterior pituitary extract.
4. Sometimes only crystals used.
5. Changes in mitochondria.
6. Adenocarcinoma.
7. One definitely malignant.
8. Average latent period 8.0-15.3 mos.
9. See 1,2,5,6-dibenzanthracene.
10. Dibenzanthracene to desoxycholic acid in the molecular ratio of 1 to 4.
11. First at 5 mos.
12. Also lung tumors in several A mice and liver tumor in one A male.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
805.--1,2,5,6-DIBENZANTHRACENE-9,10-endo-α,β-SUCCINIC ACID 								
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene, twice weekly	Skin	(?)	8 alive at 6 mos., 8 alive at 1 year	724 days
806.--1,2,5,6-DIBENZANTHRACENE-9,10-endo-α,β-SUCCINIC ACID, SODIUM SALT 								
Barry et al., 1935	60 mice	Stock	---	In aqueous soln.	S.C.	6	---	---
Burrows, 1956d	20 mice	---	---	---	S.C. & I.P.	3	10 alive at 4 mos.	66 weeks
	--do--	---	---	---	--do--	2	5 alive at 4 mos.	63 weeks
Burrows and Cook, 1936	20 mice	Stock	M	0.3% aqueous soln. twice weekly	S.C.	3[1]	---	9 mos.
	10 mice	--do--	M	--do--	S.C.	2	---	13.5 mos.
	20 mice	--do--	M	0.3% aqueous soln., 0.5 cc. twice weekly	I.P.	2	---	12 mos.
	10 mice	--do--	M	--do--	S.C.	1	---	---
Parsons, 1936	28 mice	---	---	In aqueous soln.	S.C.	9	2 alive at 280 days	280 days
Maynebrd and Parsons, 1937	52 mice	Stock	M	0.4% in saline, 0.2 cc. three times weekly	S.C.	15	6 neg. alive at 280 days	--do--
	54 mice	--do--	M	--do--[2]	S.C.	35	9 neg. alive at 280 days	--do--
Haddow, 1938c	Mice	---	---	0.4% aqueous soln. 0.25 cc. three times weekly	Inj.	Tumors[3]	---	Over 5.5 mos.
Parsons, 1938	230 mice	Stock	---	0.4% aqueous soln., 0.3 cc. thrice weekly	S.C.	Sarc.[4]	---	Over 13 weeks
	12 rats	---	---	0.4% aqueous soln., 1 cc. three times weekly	S.C.	Sarc.	---	--do--
Cook, 1939	1 mouse	---	---	0.4% aqueous soln., 0.25 cc. 11 injections	S.C.	1 sarc.	---	22 days
Warren, 1939	70 mice	Stock	---	0.4% in water, 0.3 cc. thrice weekly	S.C.	9 sarc.	---	---
Parsons and Warren[5]	Mice	---	---	---	Inj.	Tumors[6]	---	---
Parsons, 1942	5 mice	CBA	---	0.4% aqueous soln., 0.3 cc. thrice weekly	S.C.	5 sarc.[7]	---	At least 151 days

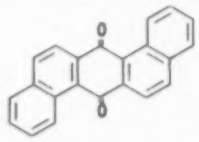
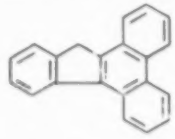
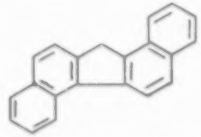
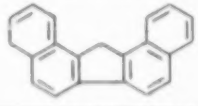
1. Leukemia also observed with this compound.
2. With irradiation with x-ray.
3. Average time of appearance 5½ months.
4. First at about one month.
5. Unpublished results cited by Cook and Kennaway, 1940.
6. Connective tissue.
7. First at 113 days.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
807.--1,2,5,6-DIBENZANTHRACENE-endo-α,β-SUCCINOYLGLYCINE ETHYL ESTER 								
Bradbury et al., 1941	13 mice	Inbred	---	5 mg. in sesame oil	S.C.	5 sarc.[3]	6 alive neg. at 9 mos.	9 mos.
808.--1,2,5,6-DIBENZANTHRACENE-SULFONIC ACIDS, SODIUM SALTS 								
Burrows, 1936d	20 mice	---	---	---	I.P.	0	11 alive at 4 mos.	29 weeks
809.--1,2,5,6-DIBENZANTHRANYL-9-CARBAMIDO-ACETIC ACID[2] 								
Creech and Franks, 1937	Mice	---	---	0.4 mg. in olive oil, repeated injections	S.C.	7	17 alive at 5 mos.	5 mos.
	Rats	---	---	In olive oil	S.C.	0	---	1 to 3 mos.
Franks and Creech, 1939	40 mice	Stock, white	---	Ca. 0.25 mg. in water, repeated injections	S.C.	1[3]	20 alive at 120 days, 5 alive at over 1 year	Over 1 year
	20 mice	--do--	---	Ca. 1 mg. in water, repeated injections	S.C.	14	16 alive at over 120 days. 3 neg. alive at 350 days	350 days
810.--1,2,5,6-DIBENZANTHRANYL-9-CARBAMIDO-CASEIN[2] 								
Creech and Franks, 1937	Rabbits	---	---	In olive oil	S.C.	0	---	1 to 3 mos.

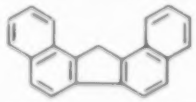
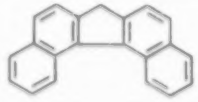
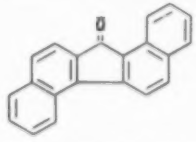
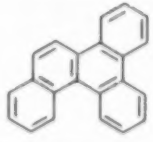
1. First at 5 mos.
2. Substance probably contains adsorbed 1,2,5,6-dibenzanthranyl-9-isocyanate.
3. Appeared at 157 days; also 2 leukemias.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
810.--1,2,5,6-DIBENZANTHRANYL-9-CARBAMIDO-CASEIN[1] (Continued) 								
Creech and Franks, 1937 (Continued)	Mice	---	---	In olive oil	S.C.	0	---	1 to 3 mos.
	Rats	---	---	--do--	S.C.	0	---	--do--
Franks and Creech, 1939	75 mice	Stock	---	0.5% in olive oil, 0.5 cc. repeated injections[2]	S.C.	0	40 alive at Ca. 8 weeks	260 days
	75 mice	Stock	---	--do--[3,2]	S.C.	7[4]	32 alive at Ca. 8 weeks	400 days
	Mice	--do--	---	0.5% in olive oil, 0.5 cc. repeated injections	S.C.	3[5]	12 alive at 120 days	214 days
	Mice	Stock	---	0.5% in olive oil, 0.5 cc. repeated injections[3]	S.C.	5[6]	22 alive at 120 days	360 days
	8 mice	--do--	---	In olive oil[7]	S.C.	1[8]	2 alive at 120 days	11 mos.
811.--1,2,5,6-DIBENZANTHRANYL-9-ISOCYANATE 								
Franks and Creech, 1939[9]	20 mice	---	---	2 mg.[10] in suspension	S.C.	1[11]	4 alive at 120 days, 2 neg. alive at over 1 year	Over 1 year
Creech, 1941[12]	14 mice	C3H	---	2 mg.[13] in tricaprylin	S.C.	14[14]	---	125 days
812.--N-1,2,5,6-DIBENZANTHRANYL-SUCCINIMIDE 								
Cook, 1932b	10 mice	---	---	0.3% in benzene	Skin	0	5 alive at 6 mos., 2 alive at 1 year	291 days
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	--do--	0	5 alive at 6 mos., 2 alive at 1 year	569 days

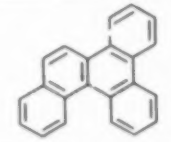
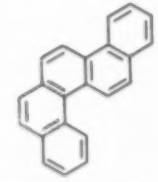
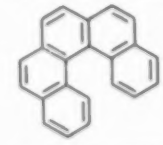
1. Substance probably contains adsorbed 1,2,5,6-dibenzanthranyl-9-isocyanate.
2. After 8 weeks, most of the animals received S.C. injections of 0.25 cc. of a 0.4% dibenzanthracene solution in oil (olive).
3. With alum added.
4. Tumors noted between 133 and 254 days.
5. Also 2 lung tumors and one leukemia.
6. Also one lung tumor.
7. With alum added. Animals afterward received 1 mg. of methylcholanthrene.
8. At 11 mos.
9. With private communication from Dr. Creech.
10. Substance melts at 181-181.5° Corr.
11. At 159 days.
12. Citing unpublished work of Warren, S. and Dunlap, C. E.
13. M.P. 179-179.5° Corr.
14. First at 92 days. Average latent period 111 days.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
813.--1,2,5,6-DIBENZANTHRAQUINONE 								
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	6 alive at 6 mos., 6 alive at 1 year	570 days
814.--1,2,3,4-DIBENZFLUORENE 								
Badger et al., 1940	20 mice	Stock	---	0.3% in benzene twice weekly for 304 days	Skin	1 epi., 1 (?) pap.	---	661 days
	10 mice	Stock	---	15 mg. in sesame oil during 55 days	S.C.	0	---	457 days
Cook et al., 1940a	Mice	---	---	---	Skin	0[1]	---	---
	--do--	---	---	---	S.C.	--do--	---	---
815.--1,2,5,6-DIBENZFLUORENE 								
Bachmann et al., 1937	20 mice	Stock	---	0.3%[2] in benzene twice weekly	Skin	3 epi., 1 pap.	10 alive at 6 mos.	354 days
	10 mice	--do--	M	0.3%[3] in benzene twice weekly	--do--	2 epi., 1 pap.	6 alive at 6 mos., 3 alive at 1 year	472 days
	10 mice	--do--	F	--do--	--do--	1 epi.	8 alive at 6 mos.	364 days
Cook et al., 1940a	Mice	---	---	---	S.C.	0[1]	---	---
Badger et al., 1940	40 mice	---	---	0.3% in benzene twice weekly	Skin	6 epi., 2 pap.	---	472 days
	25 mice	---	---	5 mg. in sesame oil, repeated injections	S.C.	0	---	266 days
816.--1,2,7,8-DIBENZFLUORENE[4] 								
Badger et al., 1940	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	2 pap., 3 epi.	---	508 days

1. No liver lesions.
2. Pure substance used.
3. Not completely purified.
4. M.P. 234°. Some doubt as to structure; see page 458 of Badger et al., 1940.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
816.--1,2,7,8-DIBENZFLUORENE[1] (Continued) 								
Badger et al., 1940 (Continued)	10 mice	Stock	---	5 mg. in sesame oil, repeated injections	S.C.	0	---	516 days
Cook et al., 1940a	Mice	---	---	---	Skin	0[2]	---	---
	--do--	---	---	---	S.C.	--do--	---	---
817.--3,4,5,6-DIBENZFLUORENE 								
Badger et al., 1942	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	6 alive at 6 mos.	354 days
	--do--	C3H	---	5 mg. in glycerol, repeated injections	S.C.	0	7 alive at 6 mos., 3 alive at 1 year	480 days
818.--1,2,5,6-DIBENZFLUORENONE 								
Badger et al., 1942	10 mice	C3H	---	0.5% in benzene twice weekly	Skin	0	---	151 days
	--do--	Stock	---	5 mg. in glycerol, repeated injections	S.C.	0	1 alive at 6 mos.	200 days
819.--1,2,3,4-DIBENZPHENANTHRENE 								
Badger et al., 1940	20 mice	Stock	---	0.5% in benzene twice weekly	Skin	8 epi., 5 pap.	---	258 days
	30 mice	Stock	---	5 mg. in sesame oil, repeated injections	S.C.	5 sarc.[3]	---	201 days
	10 mice	Stock	---	5 mg. weekly	P.O.	0	---	622 days
Cook et al., 1940a	Mice	---	---	0.5% in benzene twice weekly	Skin	1[4]	---	290 days
	--do--	---	---	5 mg. in sesame oil	S.C.	11[5]	---	211 days
	--do--	---	---	Ca. 5 mg. weekly	P.O.	3[6]	---	594 days

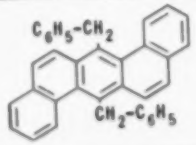
1. M.P. 234°. Some doubt as to structure; see page 458 of Badger et al., 1940.
2. No liver lesions.
3. And possibly one more sarcoma.
4. Cholangiomatous growth. Also epithelioma.
5. Cholangiomatous growth and one more possible, out of 20 livers examined. Also sarcoma at site.
6. And one more possible out of 9 livers examined.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
819.--1,2,3,4-DIBENZPHENANTHRENE (Continued) 								
Cook and Kennaway, 1940	Mice	---	---	---	Skin	Tumors	---	---
Hewett, 1940	Mice	---	---	---	---	Tumors	---	---
Harris and Bradsher, 1946	26 mice	New Buffin	---	5-15 mg. in sesame oil	S.C.	Carc.[1]	---	At least 60 weeks
820.--1,2,5,6-DIBENZPHENANTHRENE 								
Badger et al., 1940	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	1 epi., 1 pap.	---	577 days
	15 mice	--do--	---	5 mg. in sesame oil, repeated injections	S.C.	2 sarc.	---	513 days
	10 mice	--do--	---	5 mg. weekly	P.O.	0	---	529 days
Cook et al., 1940a	Mice	---	---	0.3% in benzene twice weekly	Skin	0[2]	---	579 days
	--do--	---	---	5 mg. in sesame oil	S.C.	--do--	---	513 days
	--do--	---	---	Ca. 5 mg. weekly	P.O.	--do--	---	576 days
821.--3,4,5,6-DIBENZPHENANTHRENE 								
Cook, 1933b	10 mice	---	---	0.3% in benzene	Skin	0[3]	6 alive at 1 year, 2 alive at 18 mos.	18 mos.
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	7 alive at 6 mos., 6 alive at 1 year	613 days

1. Epidermoid.
2. No changes in liver.
3. One transient papilloma.

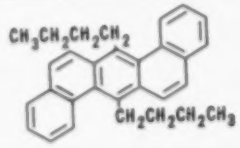
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

822.--9,10-DIBENZYL-1,2,5,6-DIBENZANTHRACENE



Cook, 1932b	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	2 epi.	5 alive at 6 mos., 3 alive at 1 year	450 days

823.--9,10-DI-n-BUTYL-1,2,5,6-DIBENZANTHRACENE



Cook, 1932b	10 mice	---	---	0.3% in benzene	Skin	0	8 alive at 6 mos., 1 alive at 1 year	631 days
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	--do--	1 epi.	--do--	742 days

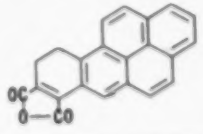
824.--DICHLOROMERCURO-3,4-BENZPYRENE $C_{20}H_{10}Hg_2Cl_2$

Dansi and Salvroni, 1942	10 rats	---	---	19 mg. in physiol saline soln.	Inj.	0	6 died of nephritis in 4 mos.	8 mos.
	4 rats	---	---	19 mg. in olive oil	Inj.	0	2 died of nephritis in 4 mos.	--do--

825.--DIELS HYDROCARBON No. 2 $C_{28}H_{24}$

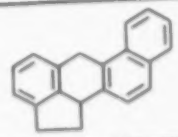
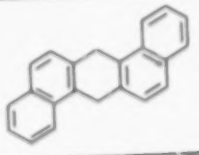
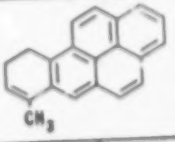
Craciun et al., 1940/41	Mice	White	---	---	S.C.	0	---	---

826.--1',2'-DIHYDRO--3,4-BENZPYRENE 3',4'-DICARBOXYLIC ANHYDRIDE

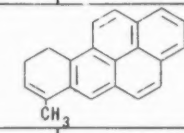
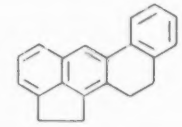
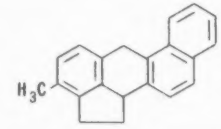
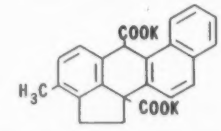
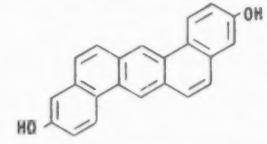


Shear, 1937b	Mice	Inbred	---	---	S.C.	0	---	---
Shear, 1939	20 mice	A	M	10 mg. crystals, repeated injections	S.C.	0[1]	10 alive at 1 year, 7 alive at 18 mos.	18 mos.

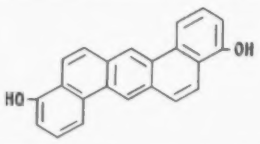
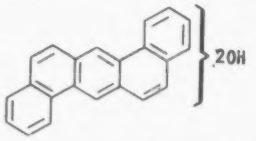
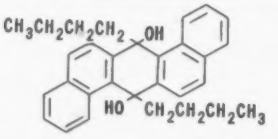
1. Lung nodules observed.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
827.--meso-DIHYDROCHOLANTHRENE 								
Bradbury et al., 1941	14 mice	inbred	---	0.3% in acetone twice weekly	Skin	0	11 alive at 8 mos.	8 mos.
	15 mice	---do---	---	0.3% in benzene twice weekly	---do---	0	14 alive at 8 mos.	---do---
	29 mice	---do---	---	2.5 mg. in sesame oil	S.C.	21 sarc.[1]	5 neg. alive at 7 mos.	7 mos.
Lav and Lewisohn, 1941	28 mice[2]	C	M & F	1 mg. in olive oil	S.C.	26 sarc.[3]	---	23 weeks
828.--9,10-DIHYDRO-1,2,5,6-DIBENZANTHRACENE 								
Cook, 1933b	10 mice	---	---	0.3% in benzene	Skin	1 pap.	7 alive at 6 mos., 1 alive at 11 mos.	11 mos.
Barry et al., 1935	---do---	Stock	---	0.3%[4] in benzene twice weekly	Skin	2 epi.	7 alive at 6 mos., 1 alive at 1 year	426 days
Cook, 1939	10 mice	---	---	[5]	---	1 pap.	7 alive at 277 days	277 days
Badger et al., 1940	10 mice	Stock	---	0.3%[6] in benzene twice weekly	Skin	2 pap.	---	619 days
Bradbury et al., 1941	16 mice	Inbred	---	In acetone	Skin	0	9 alive at 7 mos.	7 mos.
	10 mice	---do---	---	5 mg. in sesame oil	S.C.	1 sarc.	6 neg. alive at 7 mos.	7 mos.
829.--1',2'-DIHYDRO-4'-METHYL-3,4-BENZPYRENE 								
Shear, 1937b	Mice	Inbred	---	---	S.C.	Tumors	---	---
Domagk, 1938	Mice	---	---	---	Skin[7]	0	---	---
Shear[7]	27 mice	A	---	10 mg. crystals	S.C.	5[8]	---	At least 34 weeks

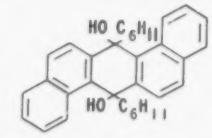
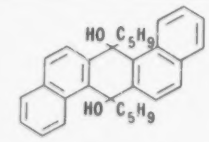
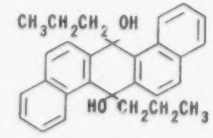
1. Average latent period 3.6 mos. First at 2 mos.
2. Effective total.
3. First at 10 weeks. Mean latent period 13.0 weeks. 19.2% with lung tumors.
4. Material very impure. For a discussion see Fieser, 1936.
5. Pure substance used.
6. Prepared by Bachmann's method. Pure.
7. Unpublished results cited by Fieser and Hershberg, 1938.
8. Average time of induction 34 weeks.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
829.--1',2'-DIHYDRO-4'-METHYL-3,4-BENZPYRENE (Continued) 								
Shear, 1939	17 mice	A	F	10 mg. crystals[1], repeated injections	S.C.	2	13 neg. alive at 13 mos.	18 mos.
	10 mice	A	M	10 mg. crystals[2], repeated injections	S.C.	3	5 neg. alive at 13 mos.	21 mos.
830.--6,7-DIHYDRO-20-METHYLCHOLANTHRENE 								
Shear, 1941*	20 mice	A	M & F	2 plus 5 mg. crystals, repeated injections	S.C.	0	---	16 mos.
831.--meso-DIHYDRO-20-METHYLCHOLANTHRENE 								
Bradbury et al., 1941	10 mice	Inbred	---	5 mg. in sesame oil	S.C.	4 sarc.	All died in 6 mos.	6 mos.
Law and Lewisohn, 1941	28 mice[3]	C	M & F	1 mg. in olive oil	S.C.	23 sarc.[4]	---	23 weeks
832.--DIHYDRO-20-METHYLCHOLANTHRENE-DICARBOXYLIC ACID, POTASSIUM SALT[5] 								
Lin and Isaacs, 1940	9 mice	Swiss	M & F	5 mg. in water twice	S.C.	0	---	8 weeks
833.--3',7'-DIHYDROXY-1,2,5,6-DIBENZANTHRACENE 								
Rhoads, 1942	12 mice	Inbred	---	4 mg. in oil[6]	Inj.	0	---	---

1. M.P. 158-159° uncorr.
2. M.P. 162-163° Corr.
3. Effective total.
4. First at 9 weeks; mean latent period 11.9 weeks. 15.4% with lung tumors.
5. Called in the paper "potassium dicarboxybenzanthracene" but according to private communication from J. T. Bradbury this is an error. Compound was made by Bachmann.
6. From metabolism of rabbit. Position of the hydroxyl groups erroneous as given.

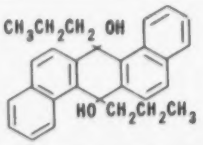
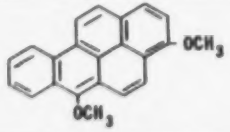
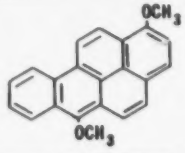
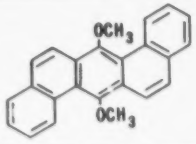
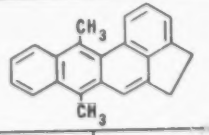
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
834.--4',8'-DIHYDROXY-1,2,5,6-DIBENZANTHRACENE[1] 								
Dunlap and Warren, 1941a	Mice	---	---	---	Inj.	0	---	7 mos.
Dunlap and Warren, 1941b	Mice	---	---	---	S.C.	0	---	Over 8 mos.
835.--DIHYDROXY-1,2,5,6-DIBENZANTHRACENE 								
Boyland et al., 1941	10 mice	---	---	0.1% in acetone twice weekly[2]	Skin	0	---	18.5 mos.
	--do--	---	---	1 mg. suspension in olive oil twice	S.C.	0	All dead at 119 days	119 days
Dobriner et al., 1939	9 mice	---	---	---[3]	Inj.	0	---	6 mos.
Dobriner et al., 1942	11 mice	Inbred	---	4 mg. (total) in lard, in 3 injections[4]	Inj.	0	2 died early	240 days
836.--9,10-DIHYDROXY-9,10-DI-n-BUTYL-9,10-DIHYDRO-1,2,5,6-DIBENZANTHRACENE 								
Burrows, 1935c	Mice	---	M	0.3% in benzene twice weekly	Skin	0	---	Over 50 days
Bachmann et al., 1937	10 mice	Stock	M	0.3% in benzene twice weekly	--do--	0	2 alive at 6 mos., 1 alive at 1 year	622 days
	20 mice	--do--	---	--do--	--do--	0	16 alive at 6 mos., 8 alive at 1 year	643 days

1. M.P. 415-8° Corr. (Cason and Fieser, 1940).
2. M.P. 340-350° (dec.). From metabolism of dibenzanthracene in rabbits. The hydroxyl groups are probably in the 4,8- position. For discussion of structure see Cason and Fieser, 1941.
3. M.P. 355-8°. From rabbits after injection with dibenzanthracene and probably identical with the product so called by Levi and Boyland, 1937.
4. From metabolism of dibenzanthracene in rabbits.

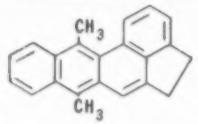
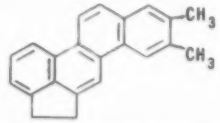
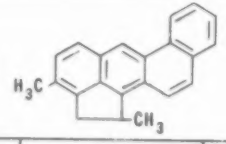
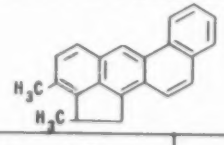
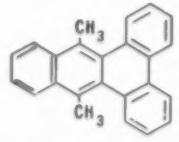
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
837.--9,10-DIHYDROXY-9,10-DICYCLOHEXYL-9,10-DIHYDRO-1,2,5,6-DIBENZANTHRACENE 								
Noble, 1938a	6 rats	Wistar	M & F	10 mg. crystals	S.C., abdominal wall	0	---	28 days
Noble, 1939b	3 rats	--do--	M & F	--do--	S.C.	0	---	4 weeks
	--do--	--do--	F	100 mg. crystals	--do--	0	---	--do--
838.--9,10-DIHYDROXY-9,10-DICYCLOPENTYL-9,10-DIHYDRO-1,2,5,6-DIBENZANTHRACENE 								
Noble, 1938a	6 rats	Wistar	M & F	10 mg. crystals	S.C., abdominal wall	0	---	28 days
Noble, 1939b	--do--	--do--	--do--	--do--	S.C.	0	---	--do--
839.--9,10-DIHYDROXY-9,10-DI-n-PROPYL-9,10-DIHYDRO-1,2,5,6-DIBENZANTHRACENE 								
Burrows, 1935c	Mice	---	M	0.3% in benzene twice weekly	Skin	0	---	Over 50 days
Bradbury, 1936	5 rats	---	---	0.4 mg. in sesame oil	S.C.	3 sarc.	2 died early	6-7 mos.
Burrows, 1936b	Mice	Stock	M	0.3% in benzene twice weekly	Skin	0[1]	---	Avg. of 211 days
Burrows, 1936c	17 mice	---	---	--do--	--do--	0	---	349 days
Wolfe, 1936	30 rats	---	F, castr.	0.2 to 0.4 mg. in sesame oil daily	S.C.	0[2]	---	---
Bachmann and Bradbury, 1937	5 rats	---	---	0.4 mg. in sesame oil, repeated injections	S.C.	4 sarc.	---	7 mos.
Bachmann et al., 1937	20 mice	Stock	M	0.3% in benzene twice weekly	Skin	0	6 alive at 6 mos.	383 days
	20 mice	--do--	---	--do--	--do-	0	16 alive at 6 mos. 2 alive at 1 year	458 days

1. Changes in mammary glands and testes noted.

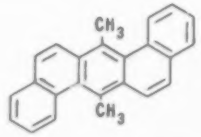
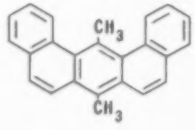
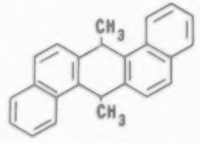
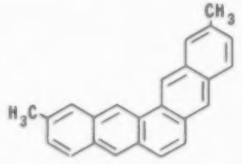
2. Estrogenic action and changes in hypophysis noted.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
839.--9,10-DIHYDROXY-9,10-DI-n-PROPYL-9,10-DIHYDRO-1,2,5,6-DIBENZANTHRACENE (Continued) 								
Noble, 1938a	6 rats	Wistar	M & F	10 mg. crystals	S.C., abdominal wall	0	---	28 days
Noble, 1939b	6 rats	--do--	--do--	--do--	S.C.	0	---	--do--
Gardner et al., 1944	18 mice	C3H	---	0.125 mg. in sesame oil weekly	S.C.	2[1]	---	---
840.--5,8-DIMETHOXY-3,4-BENZPYRENE[2] 								
Berenblum, unpub. results	10 mice	Inbred	M	2 mg. in 0.5 ml. arachis oil	S.C.	2 sarc.[3]	6 alive at 6 mos.	At least 9½ mos.
841.--5,10-DIMETHOXY-3,4-BENZPYRENE[4] 								
Berenblum, unpub. results	10 mice	Inbred	M	2 mg. in 0.5 ml. arachis oil	S.C.	1 sarc.	---	17½ mos.
842.--9,10-DIMETHOXY-1,2,5,6-DIBENZANTHRACENE[5] 								
Berenblum, unpub. results	10 mice	Inbred	M & F	2 mg. in 0.5 ml. arachis oil	S.C.	0[6]	---	28 weeks
843.--9,10-DIMETHYL-3,4'-ACE-1,2-BENZANTHRACENE 								
Shabad and Buvailo, 1946	10 mice	Stock	- -	2 mg.	S.C.	0	7 alive after 4 mos.	4 mos.

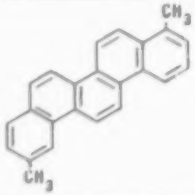
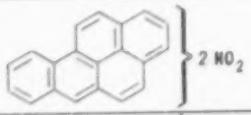
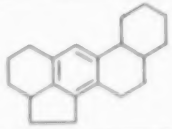
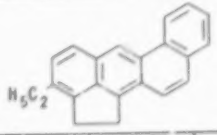
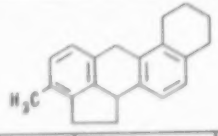
1. Lymphoid.
2. Synthesized by Schoental. Free from benzpyrene, but probably contained some 5,10-dimethoxy-3,4-benzpyrene as impurity.
3. In 9½ mos.
4. Synthesized by Schoental. Free from benzpyrene, but probably contained some 5,8-dimethoxy-3,4-benzpyrene as impurity.
5. M.P. 235-236° C. Synthesized by R. Schoental.
6. One mammary carcinoma in F mouse.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
843.--9,10-DIMETHYL-3,4'-ACE-1,2-BENZANTHRACENE (Continued) 								
Shabad and Buvaito, 1946 (Continued)	10 mice --do--	--- ---	--- ---	5 mg. 10 mg.	S.C. S.C.	4 sarc. & 1 adenoma 4 sarc.	5 alive at 4 mos. 9 alive at 4 mos.	4 mos. --do--
844.--2,3-DIMETHYL-6,7-ACECHRYSENE 								
Shear, 1938a	10 mice	A	M	5 mg. crystals	S.C.	0	7 alive at 12 mos.	12 mos.
845.--15,20-DIMETHYLCHOLANTHRENE 								
Shear and Leiter, 1941a*	16 mice	A	M & F	1 mg. in lard, repeated injections	S.C.	8	---	8 mos.
846.--16,20-DIMETHYLCHOLANTHRENE 								
Shear, 1936b	14 mice	A	---	10 mg. crystals[1]	S.C.	10[3]	---	13 mos.
847.--9,10-DIMETHYL-1,2,3,4-DIBENZANTHRACENE[2] 								
Herenblum, unpub. results	12 mice --do--	Stock Stock	F M	0.5% in benzene twice weekly 2 mg. in 0.2 ml. tricaprylin	Skin S.C.	0 0	9 alive at 36 weeks 7 alive at 25 weeks	65 weeks 65 weeks

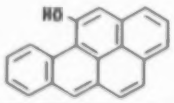
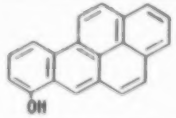
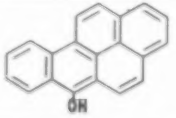
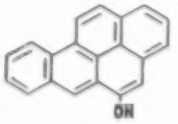
1. Melts at 169-179° Corr.
2. Synthesized by R. H. Martin.
3. First tumor during 4th month. ½ of the animals with tumors in 8 months, also some lung tumors observed.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
848.--9,10-DIMETHYL-1,2,5,6-DIBENZANTHRACENE 								
Cook, 1932b	5 mice	Stock	---	0.3% in benzene twice weekly	Skin	1 pap.	3 alive at 6 mos., 1 alive at 1 year	410 days
849.--9,10-DIMETHYL-1,2,7,8-DIBENZANTHRACENE[1] 								
Berenblum, unpub. results	10 mice 15 mice	Stock Inbred	M M	0.3% in benzene twice weekly 2 mg. in 0.2 ml. tricaprylin	Skin S.C.	5[2] 6 sarc.	--- ---	42 weeks 5 mos.
850.--cis-9,10-DIMETHYL-9,10-DIHYDRO-1,2,5,6-DIBENZANTHRACENE 								
Cook, 1932b	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	0[3]	6 alive at 6 mos., 3 alive at 1 year	538 days
851.--7,7'-DIMETHYL-2',3'-NAPHTHO-1,2-ANTHRACENE 								
Kennaway, 1930	10-20 mice	---	---	1% in benzene[4]	Skin	0	---	---
Cook et al., 1932b	20 mice	Stock	---	0.25% in benzene twice weekly	--do--	0	3 alive at 6 mos.	350 days

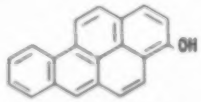
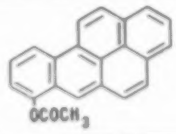
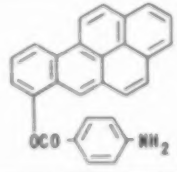
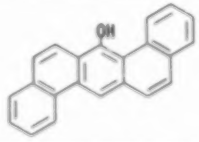
1. Synthesized by Martin and Robinson.
2. 2 malignant. Average latent period 30 weeks.
3. One cystic sebaceous adenoma.
4. Not specia' y purified.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
852.--1,8-DIMETHYLPICENE 								
Shear and Leiter, 1941b	10 mice	D	M	2 mg. plus 5 mg. crystals, repeated injections	S.C.	0	3 alive at 14 mos.	14 mos.
853.--DINITRO-3,4-BENZPYRENE 								
Windaus and Rennhak, 1937	---	---	---	(m.p. 286.5°)	---	0	---	---
854.--1,2,3,4,5,6,7,10,17,20,22,23-DODECAHYDROCHOLANTHRENE 								
Bachmann et al., 1937	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	16 alive at 6 mos., 6 alive at 1 year	618 days
855.--20-ETHYLCHOLANTHRENE 								
Shear[1]	16 mice	---	---	2	S.C.	11	---	1 year
Shear, 1938a	8 mice	A	M	10 mg. crystals	--do--	4	---	12 mos.
--do--	--do--	A	F	--do--	--do--	7	---	9 mos.
Shear, 1938c	Mice	inbred	---	---	---	Sarc.	---	---
856.--1,2,3,4,11,14-HEXAHYDRO-20-METHYLCHOLANTHRENE 								
Shear, 1956b	12 mice	A	---	10 mg. crystals[3], repeated injections	S.C.	0*	7 alive at 1 year	14 mos.

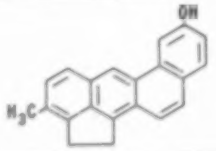
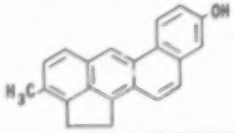
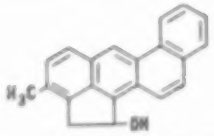
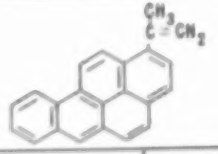
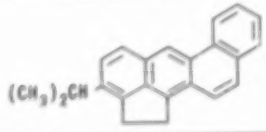
1. Unpublished results cited by Fieser and Snow, 1938.
2. M.P. 179.5-180°.
3. Melts at 156-157° corr.
4. Ulcers produced.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
857.--2-HYDROXY-3,4-BENZPYRENE 								
Dunlap and Warren, 1941b	Mice	---	---	---	S.C.	0	---	Less than 8 mos.
858.--4'-HYDROXY-3,4-BENZPYRENE 								
Bachmann et al., 1937	10 mice	Stock	---	0.3% in acetone twice weekly	Skin	0	10 alive at 6 mos., 2 alive at 395 days	395 days[1]
Shear[2]	Mice	---	---	Crystals	S.C.	0	---	16 mos.
Shear, 1937b	--do--	Inbred	---	---	S.C.	0	---	---
Shear[3]	--do--	---	---	Crystals	S.C.	0	---	16 mos.
Shear, 1939	14 mice	A	M	10 mg. crystals, repeated injections	S.C.	0[4]	12 alive at 12 mos.	18 mos.
Badger et al., 1940	10 mice	Stock	---	0.3% in acetone twice weekly	Skin	0	---	434 days
859.--5-HYDROXY-3,4-BENZPYRENE 								
Shear and Leiter, 1940**	23 mice	A	M & F	2 plus 5 mg. crystals	S.C.	0	13 alive at 1 year	16 mos.
860.--6-HYDROXY-3,4-BENZPYRENE 								
Dunlap and Warren, 1941a	Mice	---	---	---	Inj.	0 (?)	---	18 years
Dunlap and Warren, 1941b	40 mice	---	---	---	S.C.	2	---	Over 8 mos.
Warren and Dunlap, 1941[5]	50 mice	---	---	---	S.C.	1 sarc.	---	---

1. No tumors in 434 days according to Cook and De Worms, 1937.
2. Unpublished results cited by Fieser et al., 1937a.
3. Unpublished results cited by Fieser et al., 1937b.
4. One tumor, probably spontaneous; lung tumor also noted.
5. Unpublished results cited by Fieser and Heymann, 1941.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
861.--8-HYDROXY-3,4-BENZPYRENE 								
Berenblum and Schoental, 1943	10 mice	---	---	Ca. 2 mg.[1] in sesame oil, single injection	S.C.	1 sarc.	Most alive at 9 mos.	10 mos.
862.--4'-HYDROXY-3,4-BENZPYRENE ACETATE 								
Shear, 1939	10 mice	C57	F	0.5% in lard, 0.2 cc., repeated injections	S.C.	0[2]	3 alive at 16 mos.	16 mos.
	--do--	C3H	M	--do--	S.C.	--do--	6 alive at 16 mos.	--do--
863.--4'-HYDROXY-3,4-BENZPYRENE-p-AMINOBENZOATE 								
Shear, 1939	20 mice	M	M & F	5 mg. crystals	S.C.	0	12 alive at 16 mos.	16 mos.
864.--9-HYDROXY-1,2,5,6-DIBENZANTHRACENE 								
Cook, 1932b	10 mice	---	---	0.5% in benzene[3]	Skin	0	All dead at 129 days	129 days
	--do--	---	---	--do--	--do--	0	5 alive at 6 mos.	319 days
	--do--	---	---	--do--	--do--	0	8 alive at 6 mos.	291 days
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly[3]	Skin	0	5 alive at 6 mos.	623 days
	--do--	--do--	---	--do--	--do--	0	8 alive at 6 mos., 7 alive at 1 year	786 days

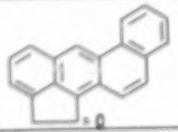
1. Crude product used.
2. Lung tumors and lymphomas noted.
3. Substance impure.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
865.--2-HYDROXY-20-METHYLCHOLANTHRENE 								
Shear and Leiter, 1941a**	20 mice	A	M & F	1 mg. crystals	S.C.	0	13 alive at 1 year	15 mos.
866.--3-HYDROXY-20-METHYLCHOLANTHRENE 								
Bachmann et al., 1937	10 mice	Stock	---	0.3% in acetone twice weekly	Skin	0	6 alive at 6 mos.	322 days[1]
Badger et al., 1940	10 mice	Stock	---	0.5% in acetone twice weekly	Skin	0	---	549 days
Shear and Leiter, 1941a**	20 mice	A	M & F	5 plus 5 mg. crystals	S.C.	0	12 alive at 1 year	17 mos.
867.--15-HYDROXY-20-METHYLCHOLANTHRENE 								
Shear and Leiter, 1941a**	20 mice	A	M & F	1 mg. in lard, repeated injections	S.C.	13[2]	---	13 mos.
868.--10-ISOPROPENYL-3,4-BENZPYRENE 								
Wingaus and Raichle, 1959	20 mice	---	---	---	Skin	1 pap.[3]	---	8 mos.
869.--20-ISOPROPYLCHOLANTHRENE 								
Shear and Leiter, 1941a**	20 mice	A	M	2 plus 5 mg., crystals	S.C.	11[4]	---	11 mos.

1. No tumors in 569 days according to Cook and De Worms, 1937.
2. First at 4 mos.
3. At 4.5 mos.
4. First at 5 mos.

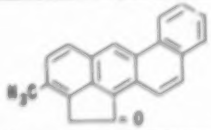
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

870.--15-KETOCHOLANTHRENE



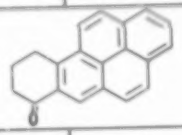
Bradbury et al., 1941	11 mice	Inbred	---	5 mg. in propylene glycol	S.C.	0	6 alive at 7 mos.	7 mos.

871.--15-KETO-20-METHYLCHOLANTHRENE



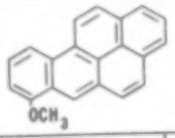
Badger et al., 1960	20 mice	Stock	---	0.1% in acetone twice weekly[1]	Skin	4 epi.	---	367 days
Cook and Kennaway, 1940	Mice	---	---	---	Skin	Epi.	---	---
Shear, 1961	20 mice	A	M & F	2 mg. crystals, repeated injections	S.C.	6	---	16 mos.
Shear and Leiter, 1941a	20 mice	A	M & F	3 plus 5 mg. crystals	S.C.	7 tumors[2]	12 alive at 1 year	16 mos.

872.--4'-KETO-1',2',3',4'-TETRAHYDRO-3,4-BENZPYRENE



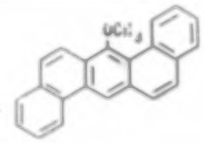
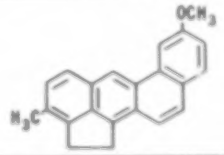
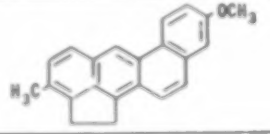
Shear, 1937b	Mice	Inbred	---	---	S.C.	0	---	---
Shear[3]	--do--	---	---	---	S.C.	0	---	---
Shear, 1939	21 mice	A	M & F	10 mg. crystals[4], repeated injections	S.C.	0[5]	20 alive at 1 year, 7 alive at 18 mos.	19 mos.

873.--4'-METHOXY-3,4-BENZPYRENE

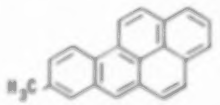
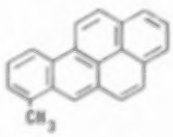
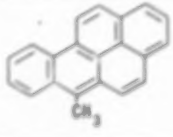
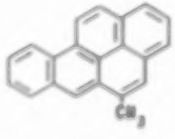


Bachmann et al., 1937	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	5 alive at 6 mos., 2 alive at 362 days	362 days[6]
Shear, 1937b	Mice	Inbred	---	---	S.C.	0	---	---
Shear, 1939	14 mice	A	M & F	10 mg. crystals	S.C.	0[7]	6 alive at 1 year	16 mos.

1. M.P. 256-7°. Called 20-methylcholanthrene-15-one.
2. First at 6 mos.
3. Unpublished results cited by Fieser et al., 1937b.
4. M.P. 172°.
5. One tumor of neck and another of lung, probably spontaneous.
6. No tumor in 444 days according to Cook and De Worms, 1937.
7. Mammary gland tumors in 3 females.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
874.--9-METHOXY-1,2,5,6-DIBENZANTHRACENE 								
Cook, 1932b	40 mice	---	---	0.5% in benzene, three times weekly	Skin	1 epi.[1]	3 alive at 6 mos.	95 to 298 days
Cook, 1933a	Mice	---	---	---	Skin	Epi.	---	---
Berry et al., 1935	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	1 epi.	3 alive at 6 mos.	298 days
	20 mice	--do--	---	--do--	--do--	6 epi., 5 pap.	17 alive at 6 mos., 2 alive at 1 year	441 days
875.--2-METHOXY-20-METHYLCHOLANTHRENE 								
[illegible] and Leiter, 1941a**	20 mice	A	M & F	2 mg. crystals, repeated injections	S.C.	0	---	17 mos.
876.--3-METHOXY-20-METHYLCHOLANTHRENE 								
Bachmann et al., 1937	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	5 alive at 6 mos., 2 alive at 370 days	370 days[2]
Badger et al., 1940	10 mice	--do--	---	0.5% in benzene twice weekly	--do--	0	---	406 days
Shear and Leiter, 1941a**	10 mice	C3H	M	5 mg. crystals, repeated injections	S.C.	0	---	1 year
877.--7-METHYL-8,9-ACE-1,2-BENZANTHRACENE								
Shear[3]	Mice	---	---	Crystals	S.C.	0	---	84 days
Shear, 1936b	11 mice	A	---	10 mg. crystals	--do--	0	10 alive at 15 mos.	15 mos.
	10 mice	A	---	0.5% in lard, 0.2 cc.	--do--	0	--do--	--do--

1. Also one cystic sebaceous adenoma.
2. No lung tumors at 549 days according to Cook and De Worms, 1957.
3. Unpublished results cited by Fieser and Seligman, 1955.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
878.--3'-METHYL-3,4-BENZPYRENE[1] 								
Schürch and Winterstein, 1935	50 mice	---	---	0.5%[2] in benzene, 2 to 3 times weekly	Skin	0	42 alive at 78 days	270 days
879.--4'-METHYL-3,4-BENZPYRENE 								
Shear[3]	56 mice	A	---	10 mg. crystals	S.C.	17[4]	---	Over 24 weeks
Shear, 1939	21 mice	A	---	10 mg. crystals[5], repeated injections	S.C.	13	2 neg. alive at 9 mos.	16 mos.
	16 mice	A	---	10 mg. crystals[6], repeated injections	S.C.	6	5 neg. alive at 15 mos.	15 mos.
880.--5-METHYL-3,4-BENZPYRENE 								
Shear and Leiter, 1940	20 mice	A	M & F	2 mg. crystals	S.C.	19	---	5 mos.
881.--6-METHYL-3,4-BENZPYRENE 								
Dunlap and Warren, 1941a	Mice	---	---	---	Inj.	Tumors	---	160 days
Dunlap and Warren, 1941b	--do--	---	---	---	Inj.	Tumors	---	--do--
Warren and Dunlap, 1941a[7]	20 mice	---	---	---	S.C.	7 sarc.[8]	---	Over 23 weeks

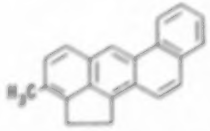
1. For structure of this compound see Fieser and Hershberg, 1938b.
2. M.P. 145-146° Corr.
3. Unpublished results cited by Fieser and Hershberg, 1938a.
4. Average time of induction 28 weeks.
5. M.P. 217.5°-218° uncorrected.
6. M.P. 221-221.5° Corr.
7. Unpublished results cited by Fieser and Heymann, 1941.
8. Average time, 23 weeks.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

882.--9-METHYL-3,4-BENZPYRENE

Dunlap and Warren, 1941a	Mice	---	---	---	Inj.	Tumors	---	85 days
Dunlap and Warren, 1941b	Mice	---	---	---	S.C.	Tumors	---	85 days
Warren and Dunlap, 1941a[1]	5 mice	C3H	---	1 mg. in tricaprylin	---	5[2]	---	Over 12 weeks

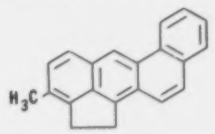
883.--20-METHYLCHOLANTHRENE



Cook and Maslewood, 1934	20 mice	---	---	0.5% in benzene twice weekly	Skin	8 epi.[3]	9 alive at 150 days	150 days
Barry et al., 1935	15 rats	---	---	2 to 3 mg. in lard weekly	S.C.	9	15 alive at 70 days	193 days
	20 mice	Stock	---	0.5% in benzene twice weekly	Skin	17 epi., 1 pap.[3]	All dead in 179 days	179 days
	20 mice	--do--	---	0.06% in benzene twice weekly	--do--	7 epi., 4 pap.	12 alive at 6 mos.	268 days
	10 mice	--do--	---	0.5%[4] in benzene twice weekly	--do--	6 epi., 1 pap	5 alive at 6 mos.	198 days
	5 mice	--do--	---	--do--	--do--	2 epi., 3 pap.	---	164 days
	10 mice	--do--	---	0.06%[4] in benzene twice weekly	--do--	5 epi., 1 pap.	6 alive at 6 mos.	252 days
	--do--	--do--	---	2 to 3 mg. in lard weekly	S.C.	2	8 died neg. in 148 days	154 days
Shear[5]	Mice	---	---	Crystals	S.C.	Tumors[6]	---	---
Sansi et al., 1936	10 rats	---	---	In lard (?)	S.C.	5[7]	1 neg. died early	186 days
Ilfeld, 1936	1 mouse	Stock	---	5% in cholesterol	Kidney	0	---	6 mos.
	2 rats	---	---	--do--	--do--	0	---	--do--
	1 rat	---	---	--do--	Spleen	1	---	4.5 mos.
	1 mouse	Stock	---	--do--	--do--	---	---	---
	1 rat	---	---	--do--	Liver	0	---	At least 10 mos

1. Unpublished results cited by Fieser and Heymann, 1941.
2. Average time of induction 12 weeks.
3. First at 75 days.
4. Highly purified sample used.
5. Unpublished results cited by Fieser and Seligman, 1935.
6. First at 65 days.
7. 4 other animals with nodules; first at 45 days; metastases to lungs in one case.

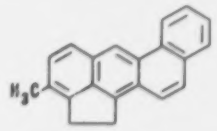
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Maisin and Coolen, 1936	67 mice	---	---	0.33% in benzene 3 times weekly	Skin	Epi.[1]	7 died early, neg.	210 days
Morelli, 1936	Rats	---	---	in lard	Inj.	Sarc.	---	30 to 120 days
Shear, 1936a	10 mice	A	---	0.5%[2] in lard, 0.25 cc. monthly	S.C.	10[3]	---	125 days
	--do--	A	---	10 mg. crystals	--do--	8[4]	---	90 days
	12 mice	A	---	10 mg. crystals, repeated injections	--do--	6[5]	3 killed for experimental purposes	94 days
	10 mice	A	---	10 mg. crystals	--do--	4[6]	5 killed for experimental purposes	140 days
Taschner et al., 1936	25 mice	---	M	0.5% in acetone twice weekly	Skin	7	Low mortality	22 weeks
	--do--[7]	---	M	--do--	--do--	20	--do--	--do--
	--do--[8]	---	M	--do--	--do--	2	--do--	--do--
Askanazy, 1937	11 rats	---	---	4 to 5 mg. in tallow, repeated injections	S.C.	5 sarc.	5 alive at 4 mos.	6 mos.
Athias, 1937	33 guinea pigs	---	---	In peanut oil, 2 injections	Brain	1[9]	---	At least 110 days
Bachmann et al., 1937	20 mice	Stock	---	0.1% in benzene twice weekly	Skin	3 epi., 2 pap.	13 alive at 6 mos.	238 days
	10 mice	--do--	---	0.3% in benzene twice weekly	--do--	5 epi.[10]	7 alive at 6 mos.	223 days
	20 mice	Simpson	---	--do--	--do--	2 pap.[11]	All dead in 141 days	141 days
	18 mice	CBA	---	--do--	--do--	15 epi., 2 pap.[12]	14 alive at 6 mos.	219 days
	22 rats	Wistar	---	--do--	--do--	2 epi., 1?[13]	12 alive at 6 mos. 4 alive at 1 year	657 days
Boyland and Warren, 1937	8 mice	CBA	M, castr.	0.4% in lard, 0.25 cc.	S.C.	1	---	At least 312 days
	9 mice	CBA	M, castr.	0.4% in lard, 0.25cc., 2 injections	S.C.	4	---	--do--
	10 mice	CBA	M	--do--	S.C.	4	---	--do-
	--do--	--do--	M	0.4% in lard, 0.25 cc.	S.C.	5	---	--do--

1. Also mammary tumors.
2. In this paper, substance melting at 178.5-179° Corr. was used.
3. First at 75 days. ½ of animals tumorous at 92 days.
4. First at 60 days. ½ of animals tumorous at 70 days.
5. First at 58 days.
6. First at 75 days.
7. Previously treated with large doses of x-rays.
8. Previously treated with light doses of x-rays.
9. Of the heart at 110 days.
10. First at 95 days; 5 in 180 days.
11. First at 80 days.
12. First at 90 days; 9 in 120 days.
13. First in 178 days.

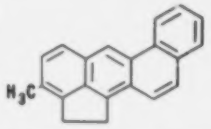
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Boyland and Warren, 1937 (Continued)	7 mice	CBA	M	0.4% in lard, 0.25 cc., 2 injections	S.C.	3	---	At least 312 days
	9 mice	--do--	F, castr.	--do--	S.C.	6	---	--do--
	7 mice	--do--	F, castr.	0.4% in lard, 0.25 cc.	S.C.	1	---	
	9 mice	--do--	F	--do--	S.C.	3	---	--do--
	6 mice	--do--	F	0.4% in lard, 0.25 cc., 2 injections	S.C.	2	---	--do--
	6 mice	--do--	F	--do--	S.C.	4	---	--do--
	10 mice	Simpson	M, castr.	--do--	S.C.	9	---	At least 121 days
	--do--	--do--	--do--	0.4% in lard, 0.25 cc.	S.C.	5	---	--do--
	--do--	--do--	M	0.4% in lard, 0.25 cc., 2 injections	S.C.	7	---	--do--
	--do--	--do--	F, castr.	--do--	S.C.	7	---	--do--
	8 mice	--do--	F, castr.	0.4% in lard, 0.25 cc.	S.C.	7	---	--do--
	10 mice	--do--	F	--do--	S.C.	6	---	--do--
	7 mice	--do--	F	0.4% in lard, 0.25 cc., 2 injections	S.C.	5	---	--do--
	50 mice	--do--	---	1 mg. in colloidal solution	S.C.	15	44 alive at 50 days	---
Brunschwig and Tschetter, 1937	13 rats	---	---	2 mg. in lard	S.C.	8 sarc.[1]	5 neg. alive at 220 days	220 days
	12 rats	---	---	--do--	S.C.	9 sarc.[2]	3 neg. alive at 220 days	--do--
Lees, 1937a	Rats	Lister	---	13.4 mg. in sesame oil	I.P.	0	---	65 days
Nakahara and Fujiwara, 1937b	40 mice	---	---	0.5% in olive oil, 0.1 cc. weekly	I.P.	9 sarc.[3]	16 alive at 77 days	114 days
Regamey, 1937	90 mice	---	---	0.3% in benzene weekly	Skin	Tumors[4]	---	Ca. 275 days
	30 mice	---	---	2 mg. in solid dextrin pill	S.C.	13[5]	---	---
	--do--	---	---	1 mg. in solid dextrin pill	I.P.	5	---	---
Sabrazès et al., 1937	Rabbits	---	---	0.5% in benzene, repeated injections	Radio-carpal joint	2[6]	---	---
Thomas, 1937	18 rats[7]	---	M & F	2 mg. in olive oil	S.C.	18	---	8 mos.
	14 rats[8]	---	--do--	--do--	--do--	14	---	6.5 mos.
	7 rats[7]	---	--do--	1.8 mg. as paste in olive oil	S.C.	3	---	At least 11 mos.
	6 rats[8]	---	--do--	--do--	--do--	5	---	10.5 mos.

1. First at 148 days.
2. First at 96 days.
3. Abdominal; first at 77 days.
4. First papilloma at 27 days; first carcinoma at 83 days.
5. First cancer in 109 days.
6. Appearing in the 4th month.
7. Adult animals.
8. Young animals.

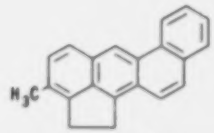
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Thomas, 1937 (Continued)	10 rats[1]	---	M & F	1.8 mg. as paste in olive oil	Eye[2]	0	---	12 mos.
	8 rats[3]	---	--do--	--do--	--do--	0	---	--do--
	Fowls[1]	---	---	In olive oil	S.C.	Tumors	---	---
	Fow's[3]	---	---	--do--	--do--	--do--	---	---
	--do--[1]	---	---	As paste in olive oil	Eye[2]	0	---	---
	--do--[3]	---	---	--do--	--do--	0	---	---
Valade, 1937a	5 rats	---	---	0.2% in arachis oil, 0.1 cc.	I.T.	1	2 neg. alive at 4 mos.	4 mos.
	--do--	---	---	0.2% in arachis oil, 0.1 cc., 2 injections	--do--	4	---	5 mos.
	40 rats	---	---	0.2% in arachis oil, 0.1 cc., repeated injections	--do--	9	26 died of infection	3.5 to 5 mos.
Valade, 1937b	50 rats	---	---	0.2% in oil, 0.1 cc. every 5 days	--do--	14[4]	Several died of infection	5 mos.
Andervont, 1938a	18 mice	Y	F	0.4% in lard, 0.2 cc.	S.C.	10	2 died neg.	34 weeks
	20 mice	C3H	M	--do--	--do--	19	---	34 weeks
Andervont, 1938c	11 mice	C	F	0.8 mg. in lard	S.C.	8[5]	---	44 weeks
	21 mice	C	M	--do--	--do--	19[5]	---	--do--
	21 mice	C57 bl.	F	--do--	--do--	17	---	--do--
	12 mice	--do--	M	--do--	--do--	11	---	--do--
	12 mice	M	F	--do--	--do--	9	---	--do--
	11 mice	M	M	--do--	--do--	8	---	--do--
	12 mice	A	M	--do--	--do--	10[5]	---	--do--
	20 mice	C3H	F	2 mg. in lard	--do--	20	---	26 weeks
	24 mice	--do--	M	--do--	--do--	24	---	--do--
	19 mice	A	F	--do--	--do--	17[5]	---	--do--
	20 mice	A	M	--do--	--do--	20[5]	---	--do--
	21 mice	I	F	2 mg. in lard	--do--	18[5]	---	--do--
	17 mice	I	M	--do--	--do--	16[5]	---	--do--
	19 mice	Y	F	--do--	--do--	11[5]	---	--do--
	12 mice	Y	M	--do--	--do--	--do--	---	--do--
	25 mice	C3H	F	0.5 mg. in cholesterol	--do--	22	---	24 weeks
	20 mice	--do--	M	--do--	--do--	19	---	--do--
	19 mice	Y	F	--do--	--do--	4	---	--do--
	12 mice	Y	M	--do--	--do--	2	---	--do--
Athias and Furtado-Dias, 1938	22 rats	---	---	0.3% in arachis oil, 0.4 cc., 2 injections	Kidney	3[6]	14 alive at 6 mos.	271 days
Bonser, 1938	25 mice	IF	---	0.3% in benzene weekly	Skin	25 pap.[7]	3 died in 23 weeks	Not over 30 weeks
	24 mice	Black agouti	---	--do--	--do--	22 pap.[8]	2 died neg. in 14 weeks	--do--

1. Adult animals.
2. In anterior chamber.
3. Young animals.
4. First in 25 days.
5. Lung tumors also obtained.
6. Abdominal tumors; metastases to lungs.
7. 16 in 12 weeks; 19 became malignant.
8. Fibrosarcoma at 8 to 12 months; no metastases.

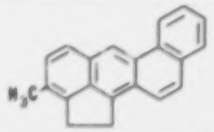
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Brunschwig, 1938	33 rats	---	---	in solid paraffin	Intra-medullary	4[1]	4 neg. alive at 16 mos.	At least 16 mos.
Brunschwig and Bissell, 1938	Rats	---	---	in cholesterol	--do--	1[2]	---	At least 12 mos.
Carruthers, 1938	Mice	A	---	in lard or spermaceti	S.C.	Tumors[3]	---	---
	--do--	C57	---	--do--	--do--	--do--	---	---
Chanovitch and Franiĉeirc, 1938	5 fowls	---	---	1% in olive oil plus embryonic pulp	S.C.	Tumors	---	Ca. 2 mos.
Domagk, 1938	10 mice	---	---	0.3% in benzene twice weekly	Skin	7	3 died early	---
Flaks and Ber, 1938a	60 mice	---	M & F	0.3% in benzene, 1 drop 3 times weekly	--do--	Epi. and pap.	---	6 mos.
Flaks and Ber, 1938b	59 mice	---	--do--	0.33% in benzene, 1 drop 3 times weekly	--do--	43	56 alive at appearance of first tumor	190 days
	20 mice	---	---	--do--	--do--	9[4]	---	150 days
Gordonoff and Ludwig, 1938	Rats	---	---	0.5% in benzene	Skin	0	---	2 mos.
	20 mice	---	---	0.5% in benzene three times weekly	--do--	Pap.[5]	---	3 mos.
	40 mice	---	---	--do--[6]	--do--	--do--	---	---
Haddow, 1938c	15 rats	Wistar	---	0.2% in lard, 1 cc. every 3 or 4 days, 7 injections	Inj.	15	---	39 weeks
	Mice	CBA	---	2 mg. in sesame oil	--do--	4	---	7 mos.
Havas and Gal, 1938	25 rats	---	---	10 mg. in sesame oil	I.P.	0	Avg. death at 21 days	Over 21 days
Lauber et al., 1938a	500 mice	---	---	0.5% in ether twice weekly[7]	Skin	Tumors	---	5 mos.
Lauber et al., 1938b	240 mice	---	---	0.5% in ether twice weekly	Skin	Tumors[8]	---	132 days
Leroy et al., 1938	12 rabbits	---	---	Aqueous colloidal solution	I.V., ear	0	All dead in 50 days	50 days
Morton and Mider, 1938	48 mice	Dilute brown	---	0.5% in benzene weekly	Skin	5[9]	3 died in 53 days	105 days

1. All became malignant.
2. Fibrosarcoma of bone at 12 mos.
3. Carcinogenic action not significantly influenced by lack of Vitamin E in diet. In Strain A mice, the incidence of primary lung tumors was markedly increased by injections of methylcholanthrene.
4. 4 were malignant.
5. In 35 to 40% of the animals.
6. Vitamin B added to diet.
7. Some animals given also doses of Vitamin B_1, B_2, and C.
8. In 100% of animals, malignant or precancerous lesions.
9. One malignant lymphomatosis observed.

883.--20-METHYLCHOLANTHRENE (Continued)

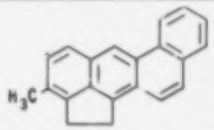


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Nakano, 1958	15 mice	---	---	0.05% in sesame oil, 0.025 cc. every 7 to 10 days	S.C.	7[1]	---	160 days
	--do--	---	---	0.05% in benzene, 2 or 3 drops every 7 to 10 days	Skin	1 epi., 5 pap.	High mortality	320 days
	Mice	---	---	0.5 and 1% in benzene	Skin	2 epi.	--do--	At least 320 days
Nicod and Regamey, 1958	120 mice	---	M	0.1% in benzene	--do--	17 epi., 79 pap.	---	Avg. of 98 days
	30 mice	---	M	0.05 mg. in olive oil repeated injections	S.C.	5	---	136 days
	--do--	---	M	0.5 mg. in olive oil, repeated injections	--do--	5	---	101 days
	--do--	---	M	1 to 4 mg. solid rod	S.C.	13	---	186 days
	--do--	---	M	2 mg. solid rod	--do--	13	---	--do--
	--do--	---	M	1 mg. in olive oil	I.M.	4	20 alive at 100 days	169 days
	--do--	---	M	--do--	Testis	1	---	116 days
	--do--	---	M	1 mg. in olive oil, 1 and 3 injections	Intra-pleural	1	---	145 and 195 days
	--do--	---	M	1 mg. solid rod	I.P.	14	---	260 days
	90 mice	---	M	Avg. of 0.033 mg. salt, in food	P.O.	0	---	345 days
Noble, 1958a	5 rats	Wistar	M	10 mg. crystals	S.C., abdominal wall	0	---	28 days
Orr, 1958	10 mice	Stock	---	0.3% in benzene weekly	Skin	Tumors	---	At least 23 weeks
	--do--	--do--	---	0.3% in acetone weekly	--do--	--do--	---	At least 18 weeks
Page, 1958	50 mice	---	---	0.5% in benzene, 3 times weekly	S.C.	17 epi.[2]	Many killed early	136 days
Shear, 1958a	10 mice	A	F	--do--	S.C.[3]	8	1 neg. alive at 4 mos.	4 mos.
	Rabbits	---	---	50 mg. crystals	S.C.	0	9 mos.	9 mos.
	Dogs	---	---	10 mg. crystals	S.C.	0	---	19 mos.
	1 cat	---	---	2 pellets	Brain	0	---	10 mos.
Shear, 1958c	Mice	Inbred	---	Pellets	Different organs	Tumors[4]	---	---
Velade, 1958	10 rats	---	---	1 mg. in oil	S.C.	2	---	6 mos.
	--do--	---	---	2 mg. in oil	S.C.	8	---	--do--
	10 rats	---	---	3 mg. in oil	S.C.	10	---	6 mos.
	6 dogs	---	---	2 mg. in oil, repeated injections	S.C.	0	---	Over 6 mos.
	1 rabbit	---	F	3 mg. in oil	Mammary tissue	0	---	---
	20 rats	---	---	In food twice weekly	P.O.	0	---	4 mos.
Weil, 1958a	3 rats	Stock	M & F	0.5 to 1% in lard	Brain	0[5]	---	219 days

1. First at 94 days, 2 other animals had early sarcoma.
2. First at 69 days.
3. Animals traumatized at site of injection.
4. Of the brain and spleen.
5. 2 granulomas obtained.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

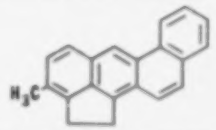
883.--20-METHYLCHOLANTHRENE (Continued)



Bell, 1938b	Rats	---	---	In lard or mixed with crystalline cholesterol	Brain	0	---	---
Yudina, 1938b	62 mice	---	M	1 mg. in chicken fat	S.C., spleen & liver	2[1]	---	123 days
Andervont, 1939a	36 mice	C3H	M	0.0625 to 0.25 mg. in lard	S.C.	0[2]	22 alive at 9.7 mos.	9 to 10 mos.
	10 mice	--do--	F	1 mg. in horse serum	S.C.	10	---	---
	9 mice	--do--	M	--do--	S.C.	9	---	---
	10 mice	--do--	F	0.5 mg. in horse serum	--do--	10	---	---
Andervont, 1939b	36 mice	A	---	0.8 mg.[3]	--do--	15[4]	Several killed early	8 weeks
	61 mice	A	---	0.375 - 1 mg.[3]	I.V.	37[4]	--do--	7 weeks
Athias and Dias, 1939	Mice	---	---	0.3% in arachis oil, 0.4 cc.	Kidney & testis	Sarc.	---	---
	Rats	---	---	--do--	Mammary gland & S.C.	--do--	---	---
Baumann et al., 1939	100 mice	C	---	1% in corn oil, 0.05 cc.[5]	S.C.	Tumors[6]	---	5 mos.
Bonser and Orr, 1939	Mice	IF	M & F	In lard, 2 injections	S.C.	Tumors	---	---
	--do--	Kreyberg white label	--do--	--do--	--do--	--do--	--	---
	--do--	Bagg albino	--do--	--do--	--do--	--do--	---	---
	--do--	CBA	--do--	--do--	--do--	--do--	---	---
	--do--	Stock	--do--	--do--	--do--	--do--	---	---
Brues et al., 1939	37 mice	C3H	---	2 mg. in lard	--do--	Tumors[7]	---	Over 8.5 weeks
	15 mice	A	---	--do--	--do--	--do--[8]	---	Over 10 weeks
	22 mice	RPE	---	--do--	--do--	--do--[9]	---	Over 15 weeks
	20 mice	I	---	--do--	--do--	--do--[10]	---	Over 16 weeks
	15 mice	C3H	---	1 mg. in lard	--do--	--do--[11]	---	Over 9.5 weeks
	22 mice	C57 bl.	---	0.45 mg. in cholesterol	--do--	--do--[12]	---	Over 12 weeks
Carruthers, 1939	71 mice	A	M & F	0.5% in lard, 0.5 cc.	S.C.	58	---	132 days
	34 mice	C57	--do--	--do--	S.C.	26	---	127 days
	36 mice	A	--do--	0.5% in spermaceti, 0.5 cc.	--do--	25	---	107 days
	17 mice	C57	--do--	--do--	S.C.	11	---	125 days
Duran-Reynals, 1939	36 frogs[13]	---	---	1 or 2 mg. in lard; or colloidal suspension in gelatine or horse serum	I.M.	0	31 died in 1 mo.	4 mos.

1. Lung adenoma. Also reticular endotheliosis in 3 cases.
2. 9 hepatomas.
3. Solvents used: lard, horse serum, lard emulsion in water, olive oil emulsion in water, mouse-fat emulsion in water, lard emulsion in serum.
4. Of the lung.
5. Different diets used.
6. In 76 to 92% of the "effective total."
7. Mean latent period 8.5 weeks.
8. Mean latent period 10 weeks.
9. Mean latent period 15 weeks.
10. Mean latent period 16 weeks.
11. Mean latent period 9.5 weeks.
12. Mean latent period 12 weeks.
13. Rana pipiens.

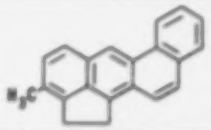
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Flaks and Ber, 1939	Mice	---	F	0.33% in benzene, 1 drop 3 times weekly	Skin	Tumors[1]	---	8 mos.
Franks and Creech, 1939	10 mice[2]	Stock	---	1 mg. in olive oil	S.C.	6	6 alive at 120 days	180 days
	8 mice[3]	---do---	---	---do---	---do---	1	2 alive at 120 days	321 days
	12 mice	---do---	---	---do---	---do---	3	3 alive at 120 days	230 days
Hildebrand, 1939	240 mice	---	---	0.5% in ether twice weekly	Skin	Tumors	---	At least 95 days
Lauber et al., 1939	Mice	---	---	In ether, up to 29 drops with or without up to 4 injections	Skin, S.C.	0	---	---
Leinati, 1939	30 mice	---	---	1% in olive oil, repeated applications	Skin[4]	29 pap.[5]	---	---
Mider and Morton, 1939a	60 mice	DBA	M & F	0.5% in benzene twice weekly	S.C.	48[6]	10 died neg. in 169 days	226 days
	14 mice	DBA sub-strain 212	---do---	---do---	---do---	7[7]	7 alive at 1 mo.	114 days
Mider and Morton, 1939b	44 mice	C57 br.	M & F	0.5% in benzene, single application	S.C.	3 carc.[8]	---	228 days
Mider and Morton, 1939c	65 mice	Dilute, br.	F[9]	0.25 or 0.5% in benzene twice weekly	S.C.	15[10]	High mortality[11]	At least 268 days
	Mice	---do---	M	---do---	---do---	0	---	---
	75 mice	---do---	F[12]	---do---	---do---	0	---	---
Noble, 1939b	5 rats	Wistar	M	10 mg. crystals	S.C.	0	---	4 weeks
Oberling et al., 1939d	15 rabbits	---	---	0.1% in oil	Intra-cerebral	0	---	Over 1 year
	10 rats	---	---	0.1%[13] in oil, 1 drop	---do---	6	---	---
	---do---	---	---	Small fragment[13]	---do---	6	---	---
Orr, 1939[14]	40 mice	---	M & F	2% in solid paraffin	S.C.	8[15]	Many killed early	343 days
	30 mice	---	---do---	---do---[16]	S.C.			
	5 mice	---	---do---	---do---	---do---			

1. Papillomas appeared at 50 days.
2. Dibenzanthranylcarbamido-casein antigen previously received.
3. Dibenzanthranylcarbamido-casein alum antigen previously received.
4. On site of cicatrices produced by thermocautery.
5. Many developed into cancers.
6. Also 40 leucoses, 8 mediastinal lymphomas, 21 carcinomas and 2 sarcomas.
7. Lymphomatosis also observed.
8. Also many papillomas, some of which regressed; first papilloma at 31 days, first carcinoma at 114 days.
9. Breeding.
10. Of the breast; average latent period 181 days; occasional metastases to lungs.
11. With leucoses.
12. Virgin.
13. M.P. 176°.
14. See also under 7-methyl-1,2-benzanthracene.
15. Of the breast. For the histology of tumors see Bonser and Orr, 1939.
16. At another site, a chrysene pellet was introduced subcutaneously.

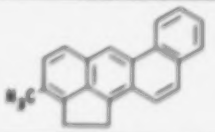
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
van Prohaska et al., 1959	15 mice	---	---	1% in olive oil, 0.12 cc., 3 times weekly	P.O.	6[1]	8 alive at 6 mos.	6 mos.
	33 mice	---	---	1% in lard, 0.12 cc. once every 2 days to twice weekly	P.O.	2[2]	Many died early	140 days
Rongoni and Beltrami, 1959	6 rats	---	---	5 mg. in lard, 5 injections	S.C.	6	---	Ca. 4 mos.
	8 rats	---	---	--do--	S.C.	8	---	--do--
	--do--	---	---	--do--	S.C.	8	---	Ca. 3 mos.
Roussy et al., 1959	Rats	---	M	Crystals[3]	intra-cerebral	5 sarc.[4]	---	At least 17 mos.
	--do--	---	M	1% in oil	--do--	1 sarc.	---	At least 8 mos.
	Rabbits	---	---	---	--do--	0	---	---
	Fowls	---	---	---	--do--	0	---	---
Seligman et al., 1959	15 mice	D	M & F	1 mg. crystals suspended in saline	Brain	0	Low mortality	6 mos.
	10 mice	A	M	2 mg. crystals suspended in saline	--do--	0	--do--	12 mos.
	18 mice	D	M & F	0.1 mg. in lard	--do--	0	--do--	17 mos.
	5 rats	---	--do--	1 mg. in saline	--do--	0	2 died in 9 mos.	18 mos.
	1 cat	---	F	5 mg. fused pellet	--do--	0	---	1 year
	10 mice	C3H	M	1.5 mg. pellet	S.C.	6	4 died neg. in 136 days	209 days
	20 mice	--do--	M	--do--	Brain	13	---	525 days
Shimkin, 1959a	11 mice	A	M & F	0.1 mg. in horse serum-cholesterol	I.T.	10[5]	---	5 mos.
	16 mice	A	--do--	--do--	I.V.	15[5]	---	--do--
Shimkin, 1959b	67 mice	C3H	M	0.5 mg. in lard	S.C.	64	---	14 mos.
	21 mice	I	M	1 mg. in lard	--do--	16	5 alive neg. at 30 weeks	30 weeks
	20 mice	L	M	0.8 mg. in lard	--do--	6	---	16 weeks
	22 mice	C3H	M	0.4 mg. in lard	S.C.	20	---	17 weeks
Shimkin and Andervont, 1959	57 mice	C3H	M	0.5 mg.[6] in lard	--do--	55[7]	---	19 weeks
	16 mice	C	M	--do--	--do--	15[7]	---	14 weeks
	25 mice	C57 bl.	M	--do--	--do--	24[8]	---	18 weeks
	22 mice	F	M	1 mg. in lard	--do--	17[9]	---	19 weeks
Steiner, 1959	Rats	---	---	---	Submaxillary glands	Tumors[10]	---	---
	Mice	---	---	---	--do--	--do--	---	---
Stewart, 1959a	61 mice	C3H	F	0.6 to 1 mg. in cholesterol	S.C.	--do--	---	90 days

1. Carcinoma of the gums, skin of chin and breast. Also papillomas of the stomach and chin.
2. Carcinoma of the mouth and hypopharynx.
3. M.P. 176°.
4. Also two "meningioblastomas."
5. Of the lung.
6. In this paper substance used melted at 178.6-179.6° Corr.
7. Average time of appearance 11 weeks.
8. Average time of appearance 12.6 weeks.
9. Average time of appearance 15 weeks.
10. Carcinomas, carcinosarcomas, epidermoid cysts.

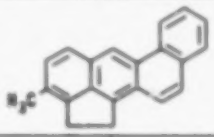
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Strong and Smith, 1939	Mice	Several inbred strains	M & F	1 mg. in sesame oil[1]	S.C., mammary glands	50[2]	---	---
	Mice	SH	F	in 1% soln.	--do--	1 carc.	---	---
Turner, 1939b	20 mice	D	M	1 mg. in lard	S.C.	13	19 alive at 6 mos.	6.5 mos.
Teort and Teort, 1939	100 mice	---	---	0.1% in chloroform	Skin	12	High mortality	40 weeks
	100 mice	---	---	0.05% in chloroform	--do--	23	--do--	--do--
	--do--	---	---	0.025% in chloroform	--do--	15	--do--	--do--
White and White, 1939	Rats	---	M	0.07% in food	P.O.	0	---	100 days
Andervont and Shimkin, 1940	10 mice	A	M & F	0.5 mg. in tricaprylin	S.C	9 sarc.[3]	---	16 weeks
Athias and Furtado-Dias, 1940	Rats & mice	---	---	0.5% in arachis oil, 0.4 cc.	Kidney, testis, mammary gland	Sarc	---	---
Bonser, 1940	56 mice	IF	M & F	1 mg. in lard, 2 injections	S.C.	52[4]	---	39 weeks
	24 mice	Strong A	--do--	--do--	--do--	22[5]	---	--do--
	50 mice	CBA	--do--	--do--	--do--	30[5]	---	--do--
	16 mice	Kreyberg white label	--do--	--do--	--do--	15[6]	---	--do--
	39 mice	Market	--do--	--do--	--do--	35[6]	---	--do--
Carruthers, 1940	34 mice	New Buffalo	---	0.6% in benzene every other day	Skin	30[7]	4 died early	110 days
	Mice	--do--	---	--do--[8]	--do--	2	49 alive at 60 days	110 days[9]
Chernyaeva, 1940	140 mice	---	---	1 mg. in chicken fat, 1 injection	S.C.	Tumors[10]	---	---
Cook et al., 1940a	Mice	---	---	---	Skin	0[11]	---	---
Dunning et al., 1940b	724 rats	Stock	M & F	1-12 mg. in paraffin in 1-5 foci	S.C.	387[12]	548 alive at 60 days	6-11 mos.
Esmarch, 1940	10 mice	Bagg albino	---	8 mg. in lard	Mammary gland	4[13]	All alive at 7 weeks	1 year
	--do--	--do--	---	--do--	Lung	3[14]	---	--do--
	--do--	--do--	---	--do--	Liver	0	All dead in 191 days	191 days
	5 mice	--do--	M	--do--	Testis	1 epi.[15]	4 alive at 117 days	219 days

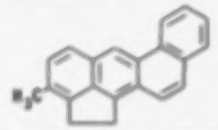
1. Following a subcutaneous injection of 0.05 cc. Higgins India ink.
2. 42 sarcomas and 8 adenocarcinomas.
3. Also 10 with lung tumors.
4. First at 11 weeks. Mammary carcinomas also appeared in females.
5. First at 13 weeks
6. First at 9 weeks.
7. One papilloma, 6 sarcomas and 23 carcinomas; first papilloma at 64 days.
8. With heptaldehyde painting on alternate days.
9. At 200 days there was a total of 23 animals with tumors--13 papillomas, 7 sarcomas and 3 carcinomas.
10. At least 7 in 3 to 4 mos.
11. No liver lesions.
12. Also mammary gland tumors.
13. First at 7 weeks, 2 sarcomas; other 2 probably benign.
14. First at 96 days. One sarcoma, one adenoma, one plasmocytoma.
15. Metastases to other testicle.

883.--20-METHYLCHOLANTHRENE (Continued)



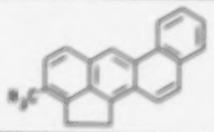
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Friedrich-Freksa, 1940	32 mice	BLH	---	50 micrograms in benzene twice weekly	Skin	32 pap.[1]	---	Ca. 12 weeks
Grady and Stewart, 1940a	60 mice	A	M & F	1.6 mg. in lard	S.C.	Tumors[2]	Many killed early for histological purposes	11 weeks
Grady and Stewart, 1940b	--do--	A	--do--	--do--	--do--	--do--	---	3 mos.
Koch-Ligeti, 1940	2 rabbits	---	---	0.05% in aq. gelatine soln., 5 cc. every 1 to 3 weeks	S.C.	0	---	300 days
Jacobi[5] and Baumann, 1940	75 mice[3]	C or albino	---	0.05-0.3% soln. twice weekly[4]	Skin	Tumors[5]	---	At least 9 mos.
	106 mice[3]	--do--	---	0.05-0.3% soln. twice weekly	--do--	Tumors[6]	---	--do--
Kirschbaum et al., 1940	83 mice	♀	---	0.5% in benzene twice weekly	Skin	Epi.[7]	---	470 days
	94 mice	C3H	---	--do--	--do--	3[8]	---	--do--
	90 mice	NH, CHI, CBAN, C57	---	0.5% in benzene weekly	--do--	0	---	14 mos.
Korostoleva and Shabad, 1940	104 guinea pigs	---	---	1% soln. in olive oil, twice, thirty days apart	Skin	0	---	Ca. 30 days
Des Ligneris, 1940	50 rats	---	---	0.5-10.0 mg. in cholesterol pellets	I.P.	Sarc.	---	24 mos.
	--do--	---	---	1% in lard, 0.5 cc.-2.5 cc.	--do--	--do--	---	--do--
	--do--	---	---	--do--	S.C.	--do--	---	27 mos.
	50 mice	---	---	0.25-1.0 mg. in cholesterol pellets	I.P.	--do--	---	7 mos.
	50 mice	---	---	0.5% in lard, 0.25 cc.-0.50 cc.	I.P.	--do--	---	--do--
	100 mice	---	---	--do--	S.C.	--do--	---	8 mos.
	300 mice	---	---	0.3% in benzene, 3 times weekly for 3 mos.	Skin	49 epi., 144 pap.[9]	254 alive at 3 mos.	6 mos.
	150 mice	---	---	--do--[10]	--do--	14 epi., 31 pap.[11]	89 alive at 3 mos.	6 mos.
	57 mice	---	---	--do--[12]	--do--	10 epi., 21 pap.[13]	49 alive at 3 mos.	3 mos.
	58 mice	---	---	--do--[12]	--do--	8 epi., 15 pap.[13]	45 alive at 3 mos.	3 mos.

1. 3 with lung metastases.
2. Of the lung, first at 32 days. Also subcutaneous tumors.
3. "Effective total."
4. Animals fed on diet containing different fats.
5. 9 of animals tumorous in 2.5-5 mos.
6. 9 of animals tumorous in 4-6.5 mos.
7. Between 100 and 200 days. Lower incidence of leukemia than in controls.
8. Before 300 days, no leukemias in controls.
9. At 3 mos., those with benign papillomas were either further painted for 3 mos., scalded 3 times weekly with hot water, or left alone.
10. Plus scalding 3 times weekly on days alternating with the painting.
11. At 3 mos., those with benign papillomas were either further painted for 3 mos., or scalded 3 times weekly with hot water.
12. Animals previously scalded 3 times weekly for 3 mos.
13. At 3 mos.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
883.--20-METHYLCHOLANTHRENE (Continued) 								
Lorenz and Stewart, 1941a	10 mice	A, backcross	M	Avg. 0.88 mg. daily in olive oil emulsion	P.O.	3[1]	---	10 mos.
Lorenz, E. and Stewart, 1941b	Mice	A, C57 br., C57 bl., C3H, A, backcross	---	In ag. olive oil emulsion	P.O.	Carc.[2]	---	7 mos.
	Mice	A, backcross	---	In ag. mineral oil emulsion	P.O.	---do---	---	7 mos.
Wilder and Horton, 1941	50 mice	C57 bl.	M & F	0.5% in benzene twice weekly	Skin	38 pap., 15 carc.	---	250 days
	50 mice	---do---	---do---	0.5% in benzene, one application	---do---	7 pap.	---	---do---
	98 mice	C57 br.	---do---	0.5% in benzene, one application then twice weekly	---do---	36 pap., 4 carc.	---	---do---
	80 mice	---do---	---do---	0.5% in benzene, 1 application plus 2 mg. in sesame oil	Skin & I.P.	21 pap., 2 carc.	---	---do---
	156 mice	---do---	---do---	0.5% in benzene, 1 application	Skin	62 pap., 7 carc.	---	---do---
Mori and Kanehara, 1941a	50 rats	---	M & F	0.5% in olive oil, 0.1 cc. weekly[3]	S.C.	3 sarc.	7 alive at 150 days	150 days
	---do---	---	---do---	---do---	---do---	12 sarc.	18 alive at 150 days	---do---
Mori and Kanehara, 1941b	7 rats	---	---	0.5% in olive oil, 0.1 cc. weekly for 90 days	---do---	3 sarc.	---	150 days
	19 rats	---	---	---do---[3]	---do---	12 sarc.	---	---do---
Teichelen, 1941[4]	1 dog	---	---	250 mg. inj. into sub-mucosa of anterior wall of stomach	inj.	0	---	9 mos.
Oberling and Guérin, 1941	60 foals	---	---	---	intra-medullary	1[5]	---	---
Peers, 1941	110 mice	Strain	M & F	10% pellets in cholesterol	Brain	29[6]	11 died early	193 days
Figueroa et al., 1941	35 rabbits	---	---	1-2 mg. in oil, 1 or 2 times	Bone	0	---	Ca. 5 mos.
	60 rats	---	---	---do---	---do---	6 sarc.	---	---do---
	10 rats	---	---	---do---	Sub-mucosa stomach	1 sarc.[7]	---	4 mos.
	94 rats	---	---	---do---	Breast	34 sarc.	---	---do---
	8 rats	---	---	---do---	Intradermal	3 sarc.[8]	---	7 mos.
	8 rats	---	---	---do---	S.C.	4 sarc.	---	---
Lall and Lhear, 1941	20 mice	A	M & F	0.1 mg. in lard	S.C.	18	---	6 mos.
	---do---	A	---do---	0.02 mg. in lard	---do---	10	6 alive neg. at 9 mos.	10 mos.

1. Carcinoma of small intestine; all animals developed lung tumors.
2. Of the stomach in A strain or in backcross mice; metastases to lungs.
3. Animals had liver.
4. Personal communication reported in Klein and Palmer, 1941c.
5. Myeloid leukemia.
6. First in 151 days; sarcomas and gliomas.
7. In 4 mos.
8. Tumors regressed spontaneously.

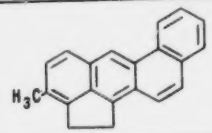
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Shear and Lifeld, 1960	10 mice	D	---	1% in cholesterol[1]	S.C.	4 sarc.	3 alive at 11 mos.	11 mos.
	--do--	D	---	0.1% in cholesterol	--do--	0	5 alive at 11 mos.	--do--
	--do--	D	---	0.01% in cholesterol	--do--	0	6 alive at 11 mos.	--do--
	--do--	D	---	0.001% in cholesterol	--do--	1[2]	4 alive at 11 mos.	--do--
	16 mice[3]	D	M	0.01% in cholesterol	--do--	0	9 alive at 12 mos.	18 mos.
Shimkin, 1960a	30 mice	A	M & F	0.5 mg. in horse serum	I.V. tail	100%[4]	Many killed at intervals	32 weeks
	33 mice	C	--do--	--do--	--do--	100%[5]	--do--	--do--
	27 mice	I	--do--	--do--	--do--	75%[6]	--do--	--do--
	24 mice	V	--do--	--do--	--do--	60%[6]	--do--	--do--
	26 mice	C5H	--do--	--do--	--do--	46%[6]	--do--	--do--
	21 mice	C57 sl.	M	--do--	--do--	17%[6]	--do--	--do--
	22 mice	L	M & F	--do--	--do--	20%[7]	--do--	--do--
Shimkin, 1960b	60 mice	A	M & F	1.5 mg.[8] in horse serum, thrice	I.V.	21[9]	8 died early	20 weeks
	66 mice	A	--do--	0.5 mg. in horse serum	--do--	55[9]	2 died early	--do--
	55 mice	A	--do--	0.1 mg. in horse serum	--do--	26[9]	---	--do--
	10 mice	A	---	--do--	--do--	0[9]	---	5 mos.
	--do--	A	---	0.05 mg. in horse serum	--do--	5[9]	---	--do--
	25 mice	A	---	0.01 mg. in horse serum	--do--	12%[9,10]	---	--do--
	20 mice	A	---	0.001 mg. in horse serum	--do--	0[9,10]	---	9 mos.
	60 mice	A	---	0.5 mg. in horse serum-cholesterol	S.C.	16%[9,11]	10 alive at 7 weeks	6 weeks
	10 mice	A	---	0.25 mg. in lard	S.C.	1[9]	---	5 mos.
	--do--	A	---	0.5 mg. in lard	S.C.	6%[9,12]	---	--do--
	11 mice	A	---	1.0 mg. in lard	S.C.	9%[9,13]	---	--do--
	55 mice	A	---	2.5 mg. in lard, tricaprylin, tricaprin, tricaprylin-trilaurin or mouse fat	S.C.	26[9]	---	30 weeks
	10 mice	A	---	0.1 mg. in lard	S.C.	1[9]	---	6 weeks
Shimkin and Anderson, 1960a	20 mice	C3H	M	0.25 mg. in tricaprylin	S.C.	20	---	14 weeks
	--do--	--do--	M	0.5 mg. in tricaprylin	--do--	20[14]	---	13 weeks
	--do--	--do--	M	1.0 mg. in tricaprylin	--do--	--do--	---	12 weeks
	--do--	--do--	M	2.5 mg. in tricaprylin	--do--	20	---	14 weeks
	11 mice	Strain	M & F	0.25 mg. in tricaprylin	--do--	9	High mortality	60 weeks
	17 mice	--do--	--do--	0.5 mg. in tricaprylin	--do--	18	---	--do--
	11 mice	--do--	--do--	1.0 mg. in tricaprylin	--do--	9	---	--do--
	17 mice	--do--	--do--	2.0 mg. in tricaprylin	--do--	16[15]	---	--do--

1. Pellets weighing 7-60 mg.
2. 2 hemangiomas; also 5 mammary gland tumors; one generalized lymphomatosis.
3. Citing unpublished results of Stewart, H. L.
4. In 6 weeks.
5. In 20 weeks.
6. In 26 weeks.
7. In 32 weeks.
8. M.P. 179.0-180.6° Corr.
9. Of the lung.
10. Results uncertain as spontaneous incidence is 30% in 9 mos.
11. First at 6 weeks.
12. Also 6 sarcomas at site.
13. Also 9 sarcomas at site.
14. First at 6 weeks.
15. First at 9 weeks.

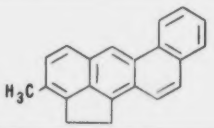
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Shimkin and Andervont, 1940b	38 mice	C3H	M	0.5 mg. in lard #A	S.C.	35[1]	---	32 weeks
	57 mice	--do--	M	--do-- #B_1	--do--	55	---	32 weeks
	19 mice	--do--	M	--do-- #B_2	--do--	19	---	--do--
	23 mice	--do--	M	--do-- #C	--do--	22	---	--do--
	25 mice	--do--	M	--do-- #D	--do--	25	---	--do--
	19 mice	--do--	M	0.5 mg. in tricaprylin	--do--	19[2]	---	12 weeks
	20 mice	--do--	M	0.5 mg. in tricaprylin #B	--do--	20[3]	---	14 weeks
	--do--	--do--	M	0.5 mg. in tricaprylin-trilaurin	--do--	20[4]	---	18 weeks
	25 mice	--do--	M	0.5 mg. in butyl stearate	--do--	24[5]	---	28 weeks
	20 mice	--do--	M	0.5 mg. in tricaproin	--do--	19[6]	---	--do--
	16 mice	--do--	M	0.5 mg. in butyl phthalate	--do--	11[7]	---	--do--
	20 mice	--do--	---	0.8 mg. in mouse fat (strain A)	--do--	20[8]	---	16 weeks
	30 mice	--do--	---	0.8 mg. in lard	--do--	30[9]	---	12 weeks
	10 mice	Y	---	1 mg. in mouse fat (strain Y)	--do--	8[10]	---	24 weeks
	9 mice	--do--	---	1 mg. in lard	--do--	5[11]	---	--do--
	187 mice	C3H	M	0.5 mg. in 13 different mouse tissue extracts	--do--	168[12]	---	Over 32 weeks
	18 mice	A	M	0.5 mg. in lard #B	--do--	15[13]	---	30 weeks
	9 mice	A	M	0.5 mg. in tricaprylin	--do--	8[14]	---	--do--
	--do--	A	M	0.5 mg. in tricaprylin-laurin	--do--	7[15]	---	--do--
	--do--	A	M	0.5 mg. in tricaproin	--do--	6[16]	---	--do--
	20 mice	A	M	0.5 mg. in mouse fat (strain A)	--do--	13[17]	---	--do--
Shimkin and Leiter, 1940	30 mice	A	M & F	0.1 mg. in horse serum	I.V.	29[18]	---	---
	100 mice	A	--do--	--do--[19]	--do--	96[18]	---	---
Stewart, 1940	30 mice	A	M	1% in liquid petrolatum, 0.03-0.05 cc.	Anterior wall of stomach	4 carc., 4 pap.	3 died post operatively at 6 mos.	17 mos.
Strong, 1940	Mice	NH	M & F	1 mg. in sesame oil	S.C.	Tumors[20]	---	---
Syverton and Berry, 1940	11 rabbits[21]	---	---	1 g. in 4 sites on each animal	S.C. & I.M.	5 sarc.[22], 1 carc.	6 alive at 175 days	At least 295 days
	8 rabbits[21]	---	---	1% in benzene 35-42 applications	Skin, ear	7 carc.[23]	---	362 days
White, A. and White, J., 1940	11 rats	---	M & F	20-30 mg. in sesame oil	I.P.	0	---	53 days

1. Average latent period in 5 samples of lard varies between 10.8 and 15.5 weeks.
2. Average latent period 8.5 weeks.
3. Average latent period 9.5 weeks.
4. Average latent period 9.7 weeks.
5. Average latent period 10.7 weeks.
6. Average latent period 12.4 weeks.
7. Average latent period 21.3 weeks.
8. Average latent period 10.2 weeks.
9. Average latent period 8.7 weeks.
10. Average latent period 18.8 weeks.
11. Average latent period 18.0 weeks.
12. Average latent period 8.4-17.9 weeks.
13. Average latent period 13.2 weeks.
14. Average latent period 12.5 weeks.
15. Average latent period 9.8 weeks.
16. Average latent period 15.1 weeks.
17. Average latent period 14.7 weeks.
18. Of the lung.
19. Receiving also I.V. injections of arsenopyrite.
20. 4 types obtained: spindle-cell sarcoma, epithelial or squamous carcinoma of skin, rhabdomyosarcoma and mammary adenocarcinoma.
21. Cotton tail (Sylvilagus).
22. Metastases in three animals.
23. Metastases in 5 animals; to lymph nodes in 2 and lungs in 3.

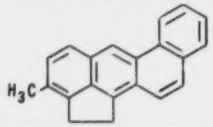
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Woglom, 1940a	260 mice	RIIi	M, castr.	0.25 mg. in paraffin	S.C.	13[1]	---	196 days
	--do--	--do--	--do--	--do--	--do--	111[2]	---	215 days
Woglom, 1940b	140 mice	--do--	M & F	0.1 mg. in olive oil[3], repeated injections	S.C.	111	---	309 days
	--do--	--do--	--do--	0.1 mg. in olive oil, repeated injections	--do--	110	---	272 days
Zimmerman and Arnold, 1940	106 mice	---	---	Pellets	Brain	24[4]	---	Ca. 10 mos.
Baumann et al., 1941	7 rats	---	---	1 mg. in coll. susp. in an. gel. soln., weekly	I.P.	0	---	6½ weeks
	Rats	---	---	--do--	--do--	0	---	8 weeks
	10 rats	---	---	4 mg. in lard, repeated injections	S.C.	100%	---	At least 19 weeks
Bessemans and Maisin, 1940/41	110 mice	White	---	2 drops triweekly, 20 times	Skin	17 pap., 10 carc.	60 alive at 60 days	At least 180 days
	126 mice[5]	--do--	---	--do--	--do--	18 pap., 10 carc.	67 alive at 60 days	--do--
Bonser and Wainman, 1941	31 mice	RIII	F	0.3% in benzene weekly	Skin	27 carc.	---	Over 21 weeks
Bradbury et al., 1941	15 mice	Inbred	---	0.3% in acetone twice weekly	Skin	14 epi.	---	At least 8 mos.
	15 mice	--do--	---	0.3% in benzene twice weekly	--do--	10 epi.	---	--do--
	14 mice	--do--	---	5 mg. in sesame oil	S.C.	13 sarc.	---	--do--
Burdette and Strong[6]	Mice	CBAN	---	1% in benzene biweekly	Skin	1[7]	---	At least 139 days
Burdette and Strong, 1941	36 mice	8 inbred	---	0.5% in methyl salicylate biweekly	Skin	pap.[8] epi.[9]	28 alive at 114 days	400 days
	25 mice	--do--	---	0.5% in benzene biweekly	--do--	pap.[10] epi.[11]	25 alive at 114 days	400 days
Cowdry and Paletta, 1941a	Mice	New Buffalo and A	---	0.6% in benzene thrice weekly	Skin	pap., carc.	---	At least 165 days
Cowdry and Paletta, 1941b	100 mice	Stock	---	0.3% in benzene thrice weekly	Skin, ear	Carc.	---	At least 120 days
Craig et al., 1941	Mice	C3H	---	In lard	S.C.	Tumors	---	---

1. Average latent period 130 days.
2. Average latent period 136 days.
3. Animals had previously been injected with minced spleen.
4. Out of 51 mice autopsied. Tumors of many different types.
5. Syphilitic.
6. Unpublished results cited by Strong and Williams, 1941.
7. Adenocarcinoma of mammary gland in 139 days.
8. Average induction time 160 days.
9. Average induction time 214 days; also some sarcomas and metastases.
10. Average induction time 156 days.
11. Average induction time 233 days. Also some carcomas. No metastases.

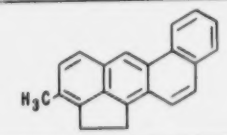
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Cramer and Stowell, 1941	Mice	Swiss	---	0.6% in benzene thrice weekly for 14 weeks	Skin	100%[1]	---	24 weeks
	10 mice	--do--	---	0.6% in benzene, every 2 weeks	--do--	9	1 died early	---
	12 mice	--do--	---	0.6% in benzene, every 3 weeks	--do--	12	---	---
	50 mice	--do--	---	0.6% in benzene, monthly	--do--	35	---	7 mos.
	6 mice	--do--	---	0.6% in benzene, once	--do--	1	--	6 mos.
	14 mice	--do--	---	--do--	--do--	1	--	4 mos.
Davenport et al., 1941	10 rats	Stock	M & F	8 mg. in rat fat	S.C.	9	1 died early	At least 162 days
	6 rats	--do--	--do--	8 mg. in linseed oil	--do--	5	--do--	At least 212 days
	18 rats	--do--	--do--	8 mg. in lard	--do--	17	---	At least 246 days
	6 rats	--do--	--do--	8 mg. in lanolin	--do--	6	---	At least 196 days
	4 rats	--do--	--do--	8 mg. in spermaceti	--do--	3	---	At least 237 days
	9 rats	--do--	--do--	5 mg. in linseed oil, 5 mg. in lanolin, and 5 mg. in lard	--do--	6	3 died early	At least 175 days
Engelbreth-Holm, 1941	53 mice	Little's DIb	M & F	0.5% in benzene, weekly for 23 weeks	Skin	Tumors[2]	10 died early	17 mos.
Engelbreth-Holm and Lefevre, 1941a	53 mice	--do--	--do--	0.5% in benzene, weekly for 23 weeks	--do--	19[3]	---	Ca. 15 mos.
Esmarch, 1941	50 mice	Bagg albino	M & F	0.3% in benzene twice weekly	Skin	Carc.[4]	All died in 40 weeks	40 weeks
	--do--	--do--	--do--	10 mg. with glycerin	S.C.	0	---	24 weeks
	--do--	--do--	--do--	--do--	--do--	Carc. & sarc.[5]	---	27 weeks
	--do--	--do--	--do--	---	I.M.	Sarc.[6]	---	27 weeks
	--do--	--do--	--do--	10 mg. moistened with glycerin	I.P.	Tumors[7]	---	280 days
	100 mice	--do--	--do--	---	Kidney	Tumors[8]	12 alive at 105 days	173 days
	50 mice	--do--	--do--	10 mg. crystals	Liver	--do--	12 alive at 3 weeks	189 days
	--do--	--do--	--do--	--do--	Lung	Sarc.[9]	29 alive at 103 days	225 days
	--do--	--do--	--do--	0.1% in olive oil weekly	S.C.	Tumors[10]	---	159 days
	--do--	--do--	--do--	--do--	S.C.	Sarc.[11]	34 alive at 10 weeks	181 days
Fardon et al., 1941	14 mice	Stock albino	M	0.5 mg. in lard	S.C.	Tumors	---	At least 3 mos.

1. First in 6 weeks; last at 24 weeks.
2. Mammary tumors in all females; epitheliomas and papillomas in males, after 11 mos.
3. With breast cancer, 17 with multiple cancers, 6 males with skin papillomas.
4. 2 with metastases to lymph nodes and lungs; lung adenomas.
5. Pavement-cell carcinoma with metastases; one spindle-cell sarcoma with metastases. 2 with lung adenomas.
6. Spindle-cell with metastases.
7. 4 with adenomas of the lung.
8. Also lymphoblastomas.
9. Spindle-cell; adenomas.
10. Of the skin, and of the lung; lymphoblastomas.
11. Spindle-cell; lymphoblastomas and lung adenomas.

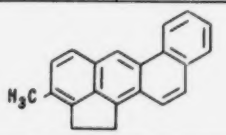
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Franseen et al., 1941a	11 rats	Slonaker	---	10% cholesterol pellet	Upper tibial epiphysis	0	---	---
	4 rats	--do--	---	Crystals	--do--	0	---	---
	14 rats[1]	--do--	---	--do--	--do--	0	---	635 days
	20 mice	C3H	---	--do--	--do--	13[2]	---	Over 225 days
	2 mice	DBA	---	--do--	--do--	0	---	---
	5 mice	C3H	---	--do--	Sub-periosteal	0	---	---
	5 mice	A	---	--do--	--do--	1[3]	---	Over 132 days
Franseen et al., 1941b	4 rats	---	---	Pellets (100%)	Thymus	0	---	---
	6 rats	---	---	--do--	Pituitary	0	---	584 days
	4 rats	---	---	10% cholesterol pellet	--do--	0[4]	---	17 mos.
	7 mice	A	---	Pellet (100%)	Pancreas	0	---	6½ mos.
	5 mice	C3H	---	--do--	Adrenal	3 sarc.[5]	---	At least 178 days
	9 mice	A	---	--do--	--do--	2 sarc.[6]	---	At least 280 days
	17 mice	A	---	Suspension in glycerol	Adrenal	0	---	---
	9 mice	C3H	---	Pellet (100%)	Lymph nodes	5 sarc.[7]	---	At least 220 days
	8 rats	---	---	--do--	Adrenal	0	---	At least 328 days
	16 mice	C	---	--do--	Lymph nodes	10[8]	---	At least 196 days
	8 mice	A	---	--do--[10]	--do--	5 sarc.[9]	---	20 mos.
	4 rats	---	---	Pellet (100%)	Salivary gland	1 carc.	2 died in 3 mos.	At least 196 days
	30 mice	A	---	--do--	--do--	17[11]	---	At least 215 days
Furth and Barnes, 1941	8 mice	AK	---	8 mg.	S.C.	8[12]	---	---
	12 mice	Rf	---	--do--	--do--	9[13]	---	---
	23 mice	F_1 hybrid	---	--do--	--do--	21[13]	---	---
	33 mice	AK	---	---	Skin	3[13]	---	Not over 10 mos.
	32 mice	Rf	---	---	--do--	26[13]	---	--do--
	37 mice	F_1 hybrid	---	---	--do--	13[13]	---	--do--
	16 mice	F_2 hybrid	---	---	--do--	14[14]	---	--do--
Gardner, 1941c	12 mice	CHI	F, castr.	0.3 mg. in sesame oil twice weekly	Vagina	7[15]	---	332 days
	6 mice	Hybrids	--do--	--do--	--do--	6[16]	---	282 days

1. 15 days old.
2. Fibrosarcomas; first at 91 days.
3. Fibrosarcoma at 132 days.
4. One rat developed widespread lymphosarcomas, but none at site.
5. Fibrosarcomas; first at 160 days.
6. Fibrosarcomas; first at 263 days.
7. Fibrosarcomas; first at 204 days.
8. 8 fibrosarcomas; and 2 hemangio-endotheliomas. First at 183 days.
9. Fibrosarcomas; first at 128 days.
10. After producing hyperplasia of the lymph nodes by injection of 0.1 cc. turpentine in gum.
11. 12 carcinomas and one fibrosarcoma; first at 69 days.
12. Also lung tumors.
13. Also lung tumors and leukemia.
14. 12 of these were subcutaneous tumors; also lung tumors and leukemia.
15. 6 of perineum; 1 of uterine cervix.
16. 5 of perineum; one of uterine cervix.

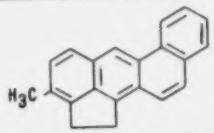
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Greenwood, 1941	19 rats	---	---	---	Brain	7[1]	---	At least 3 years
Heston, 1941	201 mice	AWF_1-WBC, AVF_1-VBC	M & F	0.5 mg. in horse serum	S.C.	Tumors[2]	---	16 weeks
Hoch-Ligeti, 1941	1 rabbit	---	---	0.05% in colloidal 1% aq- gelatine soln. 5 cc. every 4-8 weeks	S.C.	0	---	Long period
Jones et al., 1941	10 rats	Hooded buff	---	5% in cholesterol pellets	Spleen	0	---	20 mos.
	110 rats	--do--	---	10% in cholesterol pellets	Liver	0	---	--do--
Kirshbaum[3]	5 mice	F	F	Suspension in horse serum	I.V.	3[4]	---	---
Klaarenbeck, 1941	7 mice	---	---	0.1-0.3 mg.	Intra-tracheal	2 pap., sarc.[5]	---	Ca. 17 mos.
	6 mice	---	---	0.2-0.4 mg. twice, 2 mos. apart	--do--	--do--	---	--do--
Lavik and Baumann, 1941	50 mice	Commercial albino	---	0.2% in dioxane twice weekly[6]	Skin	3[7]	31 alive at 2½ mos.	6 mos.
	--do--	--do--	---	0.3% in dioxane twice weekly for 2 mos.	--do--	7[8]	35 alive at 3 mos.	--do--
	17 rats	--do--	---	0.3% in benzene thrice weekly for 10 weeks	--do--	8[9]	6 died in 10 mos.	15 mos.
Law and Lewisohn, 1941	28 mice[10]	C	M & F	1 mg. in olive oil	S.C.	25 sarc.[11]	---	23 weeks
Lorenz et al., 1941	20 mice	C3H	M	0.25% dispersion in aerosol OT soln. 0.1 or 0.2 cc.	S.C.	16 sarc.	---	53 weeks
	--do--	A	M & F	0.02% dispersion in aerosol OT soln. 0.5 cc.	I.V.	17[2]	---	8 weeks
Lorenz and Stewart, 1941	Mice	C57 br., C57 bl., C3H & Dba	---	In olive oil emulsion	P.O.	Tumors[12]	---	---
Magat et al., 1941	Rats	---	---	2 mg. in paraffin and sunflower-seed oil	I.M.	80[13]	---	Ca. 300 days
	--do--	---	---	2 mg. in paraffin and sunflower-seed oil at intervals of 1-3 mos.	--do--	76[14]	---	Ca. 232 days

1. One glioma, 4 fibrosarcomas, one possible meningioma.
2. Of the lung.
3. Cited by Strong and Williams, 1941.
4. Adenocarcinoma of the mammary gland.
5. Also lung tumors with metastases to respiratory tract.
6. Incidence of tumors increased when animals fed fats or components of fats--in mice but hardly in case of rats.
7. First at 2½ mos.
8. First at 3 mos.
9. First at 10 mos.
10. Effective total.
11. First at 8 weeks. Mean latent period 10.4 weeks. 78% with lung tumors.
12. Adenocarcinoma of the small intestine.
13. 17 with metastases.
14. 26 with metastases.

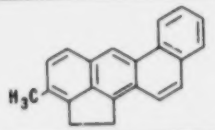
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Maisin et al., 1941	50 mice	---	---	0.25% soln. in benzene[1]	Skin	40 epi.	31 alive at 150 days	150 days
	--do--	---	---	0.25% soln. in benzene, 2 drops thrice weekly[2]	--do--	36 epi.	27 alive at 150 days	--do--
	--do--	---	---	0.25% soln. in benzene, 2 drops twice weekly[3]	--do--	32 epi.	34 alive at 150 days	--do--
Marron, 1941	25 rats	Sprague-Dawley	M & F	Up to 6 mg. (total dose) in lard for 3 weeks	I.P.	0	---	3-6 weeks
	20 rats	Inbred	---	6 mg. in lard twice	I.P.	0	---	9 mos.
	10 rats	--do--	---	20 mg. (total dose) in lard for 30 days	I.P.	0	---	120 days
Mider and White, 1941	Mice	Dil. brown	---	0.2% in ether, every 2 days	Skin	Leuk.	---	---
Morton and Mider, 1941	50 mice	dba	---	0.5% in benzene twice weekly	Skin	37[4]	---	Death
	156 mice[5]	dba_{212}	M & F	0.5% in benzene twice weekly	Skin	154[4]	---	--do--
	44 mice	dba_{212}	--do--	0.25% in benzene twice weekly	--do--	43[4]	---	--do--
	53 mice	dba_{212}	--do--	0.25% in acetone twice weekly	--do--	43[4]	---	--do--
	12 mice	--do--	--do--	0.5% in benzene twice weekly	--do--	12[6]	---	125 days
	37 mice	Old Buffalo	--do--	--do--	--do--	21[7]	---	125 days
	29 mice	New Buffalo	---	--do--	--do--	14[8]	---	--do--
	46 mice	C3H	---	--do--	--do--	38[9]	---	174 days
	42 mice	C albino	---	--do--	--do--	21[10]	---	--do--
	34 mice	C57 bl.	---	--do--	--do--	8[11]	---	250 days
Paletta et al., 1941	Mice	New Buffalo	---	0.6% in benzene thrice weekly	Skin	0	---	64 days
Rous and Friedewald, 1941	Rabbits	---	---	---	Skin	Tumors[12]	---	At least 2 years
Selle et al., 1941	Mice	C3H	---	---	---	62 sarc.	---	---
	--do--	C57 bl.	---	---	---	21 sarc.	---	---
	30 mice	C3H	---	---	S.C.	0	---	7 weeks
Shear et al., 1941	20 mice	C3H	M	1.5 mg. as pellet	Spleen	5	12 alive at 7 mos.	15 mos.
	6 mice	---	M & F	Thread coated with methylcholanthrene	--do--	0	4 alive at 12 mos.	12 mos.
	11 mice	C3H	F	Wool yarn soaked in 0.4% soln. in lard	--do--	0[13]	8 alive at 9 mos.	18 mos.
	6 mice	A	M & F	0.3-0.5 gm. in light mineral oil	--do--	0[14]	3 alive at 9 mos.	15 mos.
	15 mice	C3H	M	As pellets	--do--	0[15]	---	---

1. Plus 25 cc. olive oil in food.
2. Plus 25 cc. of 20% solution of cortex in olive oil in food.
3. Defatted cortex added to food.
4. Total leukoses.
5. Alive at 60 days.
6. Leukoses.
7. Of the skin; also 18 lung tumors and 2 leukoses.
8. Of the skin; 13 lung tumors, 5 leukoses.
9. Of the skin; 11 lung tumors, one breast tumor and 5 leukoses.
10. Of the skin; 6 lung tumors; no leukoses.
11. Of the skin.
12. Papillomas at nearly 2 mos.; infrequent cancers at 9 mos. to one year.
13. Hepatomas in different parts of the liver.
14. Sarcomas adherent to liver.
15. Three hepatomas probably spontaneous.

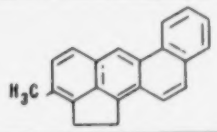
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Shimkin, 1941a	27 mice[1]	C3H	M	0.5 mg. in tricaprylin	S.C.	27	All died in 17 weeks	17 weeks
	50 mice[1]	--do--	M	0.1 mg. in tricaprylin	--do--	41	All died in 31 weeks	31 weeks
	83 mice[1]	L	M	0.2 mg. in tricaprylin	--do--	51	All died in 32 weeks	32 weeks
Shimkin and Mider, 1941a	4 guinea pigs	2	M & F	20 mg. in sesame oil	S.C.	3 sarc.[2]	---	Over 36 weeks
	5 guinea pigs	13	M	40 mg. in sesame oil	--do--	5 sarc.[2]	---	--do--
	8 guinea pigs	13	M & F	20 mg. in sesame oil	--do--	6 sarc.[2]	---	--do--
	5 guinea pigs	35	--do--	40 mg. in sesame oil	--do--	5 sarc.[2]	---	--do--
	5 guinea pigs	35	M	20 mg. in sesame oil	--do--	4 sarc.[2]	---	--do--
	7 guinea pigs	Stock	M & F	30 mg. in sesame oil	--do--	6 sarc.[2]	---	--do--
Shimkin and Mider, 1941b	40 guinea pigs	Inbred families	---	20-40 mg. in sesame oil	S.C.	29 sarc.[3]	34 alive at 18 weeks	40 weeks
Steele et al., 1941	18 mice	M	---	1 mg. in sesame oil	S.C.	9 sarc.	9 died neg.	16 mos.
Stewart, 1940[4]	7 mice	C3H	M	In lard	Testis	0	---	12-20 mos.
	12 mice	--do--	M	Thread soaked in lard soln.	--do--	0	---	--do--
	9 mice	--do--	M	Thread coated with methylcholanthrene	--do--	6 sarc.	---	6-11 mos.
Stewart and Lorenz, 1941	Mice	C3H	M	2% dispersion in horse serum 0.03 to 0.05 cc.	Stomach	4[5]	---	---
	Mice	---	---	In mineral oil soln. or as solid pellet	Stomach	Tumors[6]	---	---
Strong, 1941	800 mice	NH	---	1 mg. in sesame oil	S.C.	592[7]	---	230 days
Strong and Williams, 1941	--do--	--do--	M & F	--do--	--do--	Sarc.[9] and carc.[9]	---	240 days
Sweet and Bailey, 1941	42 rats	Wistar	---	Crystals	Brain	5[8]	---	22 mos.
	36 mice	--do--	---	--do--	--do--	5[10]	---	Less than 6 mos.
White and Mider, 1941	93 mice	dba	---	0.2% in ether, every 2 days[11]	Skin	58[12]	---	Over 191 days
Zimmerman and Arnold, 1941a	103 mice	C3H	M	Cholesterol pellet	Brain	48[13]	---	378 days
Zimmerman and Arnold, 1941b	Mice	C3H	Fe!	Pellets	--do--	Tumors[14]	---	Over 270 days
	--do--	ABC	---	--do--	--do--	Tumors[15]	---	At least 220 days
	--do--	Bagg albino	---	--do--	--do--	Tumors[15]	---	--do--
	--do--	dba	---	--do--	--do--	0	---	220 days

1. Corrected for extaneous mortality during experiment.
2. Fibrosarcomas and liposarcomas obtained, average latent time 20 to 27.5 weeks. Metastases to lungs in 4 animals.
3. Metastases to lungs.
4. Unpublished results cited by Shear et al., 1940.
5. Adenocarcinomas.
6. Adenocarcinomas mixed with sarcomas.
7. 209 spindle-cell sarcomas; 83 skin carcinomas; 56 mixed carcinomas and sarcomas; 244 tumors at other sites (mammary gland and lung).
8. 2 intercranial; 3 extracranial sarcomas; first noted at 5 mos. autopsy.
9. Spindle-cell sarcoma, skin carcinoma, rhabdomyosarcoma, and 45 mammary carcinomas.
10. Spindle-cell.
11. On 3 different diets.
12. Leukemia; lower incidence in mice on low fat diet.
13. 25 gliomas and 3 sarcomas, other mixed and unclassified tumors. Average time of appearance of sarcoma 195 days; of gliomas 279 days.
14. In about 25% of animals. 21 gliomas average latent period 270 days; 9 tumors in part sarcomatous and gliogenous (average latent period 195 days).
15. In about 10% of animals.

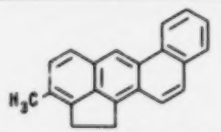
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Andervont and Shear, 1942	26 mice	C3H	M	5% pellets in cholesterol for 2 weeks	S.C.	6[1]	---	40 weeks
	25 mice	--do--	M	5% pellets in cholesterol for 4 weeks	--do--	14[2]	---	--do--
	41 mice	--do--	M	5% pellets in cholesterol for 6 weeks	--do--	35[3]	---	--do--
	15 mice	--do--	M	5% pellets in cholesterol for 8-12 weeks	--do--	15[2]	---	--do--
	--do--	--do--	M	5% pellets in cholesterol; pellets not removed	--do--	15[3]	---	--do--
Campbell, 1942	75 mice	---	M & F	Dried pptd silica containing 0.16% MCA, as dust in air, 30 hrs. exposure per week	Inhalation	15[4]	---	710 days
Carruthers, 1942	42 mice	Swiss	M & F	0.025 mg. in lard twice weekly	I.P.	13 sarc.[5]	---	123 days
	10 rats	---	M & F	3 mg. in lard, 5 injections	I.P.	0	---	55 days
	6 mice	Swiss	---	0.3 mg. in lard, biweekly	--do--	0	---	8 weeks
Cooper and Reller, 1942	52 mice	A	M	0.6% in benzene twice weekly	Skin	Pap.[6], carc.	---	24 weeks
Cramer and Stowell, 1942a	36 mice	Swiss	M & F	0.6% in benzene thrice weekly	--do--	Pap. & carc.[7]	---	24 weeks
	40 mice	--do--	--do--	0.3% in benzene thrice weekly	--do--	Pap. & carc.	---	---
	20 mice	--do--	--do--	0.6% in benzene, single application[8]	--do--	3 carc.[9]	---	7 mos.
	33 mice	--do--	--do--	0.3% in benzene twice weekly	--do--	Pap. & carc.	---	---
Cramer and Stowell, 1942b	50 mice	--do--	---	0.6% in benzene, every 2 days for 12 weeks	--do--	4 carc.	Many killed early	3 mos.
	25 mice	--do--	---	0.6% in benzene, single application	--do--	Pap.	---	4 weeks
Esmarch, 1942	10 rats[10]	White	F	Crystal moistened with glycerin	Inj.	8 sarc.	All dead by 15 mos.	15 mos.
	--do--	--do--	---	--do--	I.M.	7 sarc.	--do--	--do--
	6 rats	--do--	---	--do--	Thyroid	3 sarc., 3 epi.	2 alive at 2 mos.	--do--
	8 rats	--do--	---	--do--	I.P.	5 sarc.	---	--do--
	10 rats	--do--	---	--do--	Liver	3 sarc.	---	--do--
	5 rats	--do--	---	--do--	Spleen	3 sarc.[11]	All dead at 14 mos.	--do--
	10 rats	--do--	---	--do--	Kidney	6 sarc.	All dead at 13 mos.	--do--
	5 rats	--do--	---	--do--	Cervix	5 sarc.[12]	1 alive at 15 mos.	--do--
	9 rats	--do--	---	--do--	Testis	0	3 alive at 13 mos.	--do--
	30 rats	--do--	---	--do--	Brain	0[13]	4 alive at 2 hours after inj.	--do--
	9 rats	--do--	---	--do--	Lung	3 sarc.	All dead at 4½ mos.	4½ mos.

1. First at 14 weeks.
2. First at 12 weeks.
3. First at 10 weeks.
4. Of the lung (malignant), an increase over control.
5. Origin difficult to determine; no liver tumors.
6. First papilloma at 6 weeks; first carcinoma at 8 weeks.
7. First at 6 weeks; also 2 sarcomas.
8. Estimated dose, 0.1 mg.
9. First at 4 months; also one sarcoma at 3 months.
10. Half were irradiated. No effect noted.
11. All had sarcoma of the abdominal wall.
12. Metastases to the lung.
13. 4 with sarcoma of the subcutaneous tissue.

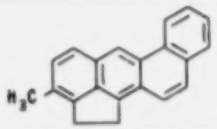
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Kirschbaum and Strong, 1942	107 mice	F	---	0.5% in benzene twice weekly	Skin	73 carc.[1], 7 sarc.	---	At least 300 days
	30 mice	F	---	--do--	--do--	20[2]	---	--do--
	13 mice	F	M & F	1 mg. in horse serum dispersion	I.V.	3[3]	---	--do--
Lanzara, 1942	Rabbits	---	---	Up to 27 mg.	Inj.	0	---	---
Lavik et al., 1942	282 mice[4]	---	---	0.2 - 0.3% soln., for 2 mos.[5]	Skin	67	---	6 mos.
	838 mice[6]	---	---	--do--	--do--	519	---	--do--
	20 mice	Stock	---	0.2% in dioxane twice weekly for 2.5 mos.	--do--	Tumors	---	2.5 mos.
	24 mice[7]	---	---	0.3% in dioxane twice weekly for 2 mos.	--do--	Tumors[8]	---	6 mos.
	23 mice[7]	---	---	0.3% in dioxane twice weekly for 3 mos.	--do--	Tumors[9]	---	4.5 mos.
	22 mice[7]	---	---	0.2% in dioxane twice weekly for 2 mos.	--do--	Tumors[10]	---	6 mos.
	23 mice[7]	---	---	0.2% in dioxane twice weekly for 3 mos.	--do--	Tumors[9]	---	--do--
	29 mice	---	---	0.3% soln. for 1 mo.[11]	--do--	0	---	5 mos.
	16 mice	---	---	--do--[12]	--do--	Tumors[10]	---	--do--
	--do--	---	---	0.3% soln. for 2 mos.[12]	--do--	Tumors[13]	---	3.5 mos.
	17 mice	---	---	0.3% soln. for 1 mo.[12,14]	--do--	Tumors[15]	---	5 mos.
	--do--	---	---	--do--[16]	--do--	Tumors[17]	---	--do--
McEndy et al., 1942	37 mice	R1	---	0.5% in benzene twice weekly	Skin	Carc. & pap.[18]	---	23 weeks
	12 mice	Rf and Ak hybrids	---	--do--	--do--	4[19]	---	21 weeks
	24 mice	--do--	---	--do--	--do--	14[20]	---	20 weeks
	25 mice	--do--	---	--do--	--do--	17[21]	---	14 weeks
Paletta and Cowdry, 1942	Mice	New Buffalo A & Swiss	---	0.6% in benzene thrice weekly[22]	Skin	30 carc.	---	At least 161 days
Paletta and Max, 1942	40 mice	Swiss	F	0.3% in benzene every 4 days	Skin	Pap. & carc.[23]	One died	25 weeks
	--do--	--do--	F	--do--[24]	--do--	Pap., carc.[25]	--do--	--do--
Parsons, 1942	14 mice	CBA	---	Crystals plus 0.6 mg. in purified cooking fat, weekly	S.C.	2 sarc.[26]	9 killed before 34 days	---

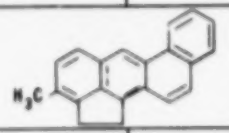
1. 32 developed leukemia before 300 days. Average time of appearance 127 days.
2. 10 developed leukemia before 300 days. Average time of appearance 134 days.
3. Mammary cancer (3 of 6 females); one developed leukemia before 300 days.
4. Effective total; animals on control diet.
5. Other animals also painted with other hydrocarbons.
6. Effective total; animals on various diets high in fat.
7. Effective total.
8. In 17% of animals.
9. In all animals.
10. In 18% of animals.
11. On stock diet.
12. On grain diet.
13. In 70% of animals.
14. Also incision made on painted area.
15. In 21% of animals.
16. On grain and fat diet.
17. In 12% of animals
18. 8 with leukemia; first leukemia at 12 weeks. Also lung tumors.
19. Leukemias; first at 11 weeks.
20. Leukemias; first at 12 weeks.
21. Leukemias; first at 10 weeks.
22. Animals also injected with colchicine.
23. First at 6 weeks.
24. Receiving also a solution of alpha-estradiol benzoate in chloroform on skin every 4 days.
25. First at 12 weeks.
26. By 38 days.

883.--20-METHYLCHOLANTHRENE (Continued)



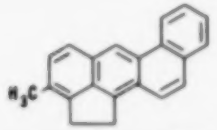
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Roussy et al., 1942a	20 mice	---	---	1 mg. in olive oil	S.C.	11	---	Over 6½ mos.
	--do--	---	---	0.1 mg. in olive oil	--do--	7	---	Over 8½ mos.
	10 rats	---	---	1 mg. in olive oil	--do--	7	---	Over 8 mos.
	20 rats	---	---	0.1 mg. in olive oil	--do--	13	---	Over 12-1/3 mos.
Roussy et al., 1942b	Mice	---	---	20 micrograms in olive oil	S.C.	1 sarc.	8 alive at 11½ mos.	At least 11.5 mos.
Roussy et al., 1942d	20 mice	---	M & F	1 mg. in olive oil	S.C.	11 sarc.	---	Ca. 10 mos.
	18 mice	---	--do--	0.1 mg. in olive oil	--do--	7 sarc.	---	Ca. 19 mos.
	10 rats	---	--do--	1 mg. in olive oil	--do--	7	---	Ca. 15 mos.
	20 rats	---	--do--	0.1 mg. in olive oil	--do--	13	---	Ca. 12 mos.
	8 rats	---	--do--	0.02 mg. in olive oil	--do--	1	---	Ca. 11 mos.
Ruffilli, 1942	20 mice	---	---	2 mg. in paraffin[1]	S.C.	3[2]	---	Ca. 6 mos.
Rusch et al., 1942	40 mice	ABC	M & F	0.3% in benzene twice weekly[3]	Skin	30 carc., pap.	---	28 weeks
	24 mice	--do--	--do--	0.1% in acetone, three times weekly for 2 mos.	--do--	Tumors[4]	---	6 mos.
	--do--	--do--	--do--	0.1% in acetone thrice weekly for 4 mos.	--do--	Tumors[5]	---	--do--
Van der Schueren and Verweire, 1942	35 mice	---	M & F	in 2% olive oil, 0.2 cc. weekly	Intra-rect.	3[6]	20 alive at 202 days	At least 202 days
Segaloff, 1942	148 mice	CHI	M & F	1.5 and 3.0 mg. pellets[7]	S.C.	80 sarc.[8]	108 alive at appearance of first tumor	At least 24 weeks
Shimkin and Lorenz, 1942	191 mice	A	---	0.1 mg. in horse-serum-cholesterol	I.V., tail	165[9]	---	8-18 weeks
	20 mice	A	---	--do--	--do--	14[9]	---	20 weeks
	20 mice	A	---	0.02 mg. in horse-serum-cholesterol, 5 injections	--do--	13[9]	---	--do--
	--do--	A	---	0.08 mg. in horse-serum-cholesterol	--do--	10[9]	---	14 weeks
	40 mice	A	---	0.02 mg. in horse-serum-cholesterol, 4 injections	--do--	9[9]	18 died early	--do--
Smith et al., 1942	50 rats	Denver	M	10 mg. in paraffin (low-melting)[10]	S.C.	Tumors[11]	---	Over 107 days
Steiner, 1942a	46 mice	---	M & F	1 mg. in cholesterol pellet	Salivary gland	25[12]	26 alive at 15 weeks	17-1/4 mos.
	16 rats	---	---	5 mg. in cholesterol pellet	--do--	5[13]	7 alive at 7 mos.	12-1/4 mos.

1. Treated with colchicine 35 days after first injection.
2. One, possibly two, malignant.
3. Other animals irradiated with U.V. light, and painted with hydrocarbons.
4. In 41% of animals.
5. In 52% of animals.
6. One had also a lymphosarcoma and an epithelioma.
7. Some also injected with estradiol benzoate in sesame oil with no difference in latent period or incidence.
8. Average latent period 18 weeks.
9. Of the lung.
10. Other animals with different endocrine glands extirpated or administered different hormones.
11. Mean latent period 107 days.
12. Different types. All after 15 weeks.
13. Mostly carcinoma. First at 7 mos.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
883.--20-METHYLCHOLANTHRENE (Continued) 								
Steiner, 1962a (Continued)	25 guinea pigs	---	---	10 mg. in cholesterol pellet	Salivary gland	4[2]	8 alive at 16-1/4 mos.	26 mos.
	11 rabbits	---	---	10 mg. in sesame oil	Sub-maxillary gland	0	6 alive at 10 mos.	23 mos.
Steiner, 1962b	Mice, rats, guinea pigs & rabbits	---	---	---	Salivary gland	Tumors[3]	---	---
Stewart and Lorenz, 1962	7 mice	C3H	M	0.5 mg. on thread	Pyloric stomach	0	---	---
	14 mice	A	M	0.54 mg. in mineral oil	--do--	2[1]	---	At least 12 mos.
	11 mice	A	F	--do--	--do--	1[1]	---	--do--
	15 mice	A	M	0.2 mg. in horse serum dispersion	--do--	5[1]	---	---
	11 mice	A	M	0.41 mg. in mineral oil	--do--	1[1]	---	---
	17 mice	C3H	M	--do--	--do--	9[1]	---	At least 9 mos.
	16 mice	C57 bl.	M	0.54 mg. in mineral oil	--do--	7[1]	---	At least 18 mos.
	14 mice	C	M	--do--	--do--	6[1]	---	At least 14 mos.
	47 mice	C3H	M	0.8 mg. in horse serum dispersion	--do--	47[1,4]	---	46 weeks
	35 mice	--do--	M	0.2 mg. in mineral oil	--do--	17[1]	---	At least 13 mos.
	28 mice	A	M	0.14 mg. in mineral oil	--do--	6[1]	---	At least 16 mos.
	4 mice	I	M	0.14 mg. in mineral oil plus 0.6 mg. in horse serum dispersion	--do--	2[1,4]	---	46 weeks
	19 mice	I	M	0.14 mg. in mineral oil	--do--	4[1]	---	At least 13 mos.
	5 mice	C57 bl.	F	0.14 mg. in mineral oil	Pyloric stomach	7[1]	---	At least 12 mos.
	7 mice	--do--	M	--do--	--do--	5[1]	---	At least 11 mos.
	11 mice	dba	M	--do--	--do--	1[1,4]	---	At least 5 weeks
	2 mice	--do--	F	--do--	--do--	2[1]	---	At least 10 mos.
	Mice	A	M	0.2 mg. in horse serum dispersion	--do--	2[1]	---	At least 8 mos.
	Mice	C3H	M	0.4 mg. in horse serum dispersion	--do--	1[1,4]	---	At least 13 weeks
	--do--	I	M	--do--	--do--	--do--	---	At least 26 weeks
	--do--	C57 br.	M	0.14 mg. in mineral oil	--do--	--do--	---	51 weeks

1. Figures refer to total number of tumors (not animals); types of tumors are: adenoma, adenocarcinoma, adenoacanthoma, adenocarcinoma and sarcoma mixed, adenoacanthoma and sarcoma mixed, sarcoma, squamous sarcoma, carcinoma of forestomach, and squamous papilloma of forestomach.
2. 3 carcinomas and one sarcoma; first at 16½ months.
3. Carcinomas in all but rabbits; only metaplasia in rabbits.
4. Only experiment in which adenocarcinomas were produced.

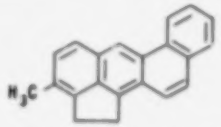
683.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Stowell, 1942	Mice	New Buffalo	---	0.6% in benzene thrice weekly for 3 mos.	---	Pap. and carc.	---	Over 3 mos.
Stowell and Cramer, 1942a	59 mice	Swiss	F	0.3% in benzene thrice weekly	Skin	Carc.[1]	---	29-31 weeks
	--do--	--do--	F	0.3% in acetone thrice weekly	--do--	--do--	---	--do--
	45 mice	--do--	F	0.3% in benzene plus 0.3% in acetone, on alternate days	--do--	--do--	---	--do--
Stowell and Cramer, 1942b	50 mice	Swiss	F	0.6% in benzene monthly	Skin	35[2]	---	At least 7 mos.
	59 mice	--do--	F	0.3% in benzene thrice weekly for 14 weeks	Skin	36[2]	---	--do--
Syverton et al., 1942	11 rabbits[3]	---	---	1 g. in tricaprylin	S.C. and I.M.[4]	6[5]	5 died neg. by 175 days	295 days
Taylor and Pollack, 1942	41 mice	Dba, C57	---	0.4 mg. in olive oil	S.C.	Tumors	---	103 days
Wallace et al., 1942	104 mice[6]	C3H	M	2 mg. in lard	--do--	67[7]	---	15 weeks
	108 mice[6]	--do--	M	--do-	--do--	92[9]	---	--do--
	105 mice[8]	--do--	M	--do--	--do--	94[10]	---	--do--
	100 mice[8]	--do--		--do--	--do--	66[11]	---	--do--
Weil and Nethertington, 1942	1 rat	White	M	Crystals	Infundibulum	Tumor[12]	---	359 days
White and Stewart, 1942	50 mice	C3H	M & F	0.0004% in food	P.O.	12[13]	---	289 days
	52 mice	C	--do--	--do--	--do--	4[13]	---	--do--
Blumenfeld, 1943	65 mice	CBA	M	0.3% in benzene twice weekly	Skin	Tumors[14]	---	Over 124 days
Bryan and Shimkin, 1943	20 mice	C3H	M	1.0 mg. in tricaprylin	S.C.	20[15]	---	Over 2.4 mos.
	21 mice	--do--	M	0.5 mg. in tricaprylin	--do--	21	---	Over 2.6 mos.
	--do--	--do--	M	0.25 mg. in tricaprylin	--do--	21	---	Over 2.8 mos.
	--do--	--do--	M	0.125 mg. in tricaprylin	--do--	21	---	Over 3.3 mos.
	--do--	--do--	M	0.062 mg. in tricaprylin	--do--	17	---	Over 3.9 mos.
	20 mice	--do--	M	0.031 mg. in tricaprylin	--do--	13	---	Over 5.2 mos.
	18 mice	--do--	M	0.0156 mg. in tricaprylin	--do--	6	---	Over 4.6 mos.
	17 mice	--do--	M	0.0078 mg. in tricaprylin	--do--	3	---	7 mos.
	158 mice	--do--	M	0.00024 to 0.0059 mg. in tricaprylin	--do--	0	---	Over 7 mos.

1. In practically all survivors.
2. Also osteosis cutis.
3. Western cottontail.
4. 4 sites in each animal.
5. 5 sarcomas and 2 carcinomas; one with both types; 2 animals had metastases.
6. Animals kept in hot room.
7. Average latent period 9.6 weeks.
8. Animals kept in cold.
9. Average latent period 11.8 weeks.
10. Average latent period 10.0 weeks.
11. Average latent period 11.6 weeks.
12. Pars nervosa and pars tuberalis.
13. Adenoma of the small intestine. Metastases to mesentery; hemangioendothelioma, pulmonary tumors.
14. Carcinomas and occasional fibrosarcomas; also papillomas.
15. For morphology and growth of these tumors see Shimkin and Bryan, 1943.

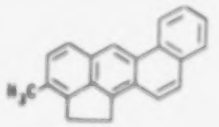
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Burdette, 1943	187 mice	C3H and JK, hybrids	M & F	1 mg. in sesame oil	S.C.	185[1]	---	Ca. 1 year
Burdette and Strong, 1943	1058 mice	CBA, C3H, CHI, JK and RH	--do--	1 mg. in sesame oil	S.C.	876[2]	---	1 year
Cowdry, 1943	Mice	New Buffalo	---	0.6% in benzene thrice weekly[3]	Skin	Tumors	---	Ca. 60 days
Cramer and Stowell, 1943a	14 mice	Swiss	F	0.6% in benzene once (Ca. 0.3 mg.)	Skin	6[4]	---	At least 42 weeks
	20 mice	--do--	F	0.1 mg. in benzene thrice weekly for one week	--do--	43 carc.[5]	---	11 mos.
	--do--	--do--	F	0.1 mg. in benzene thrice weekly for 2 weeks	--do--	47 carc.[5]	---	--do--
	--do--	--do--	F	0.1 mg. in benzene thrice weekly for 4 weeks	--do--	50 carc.[5]	---	--do--
Cramer and Stowell, 1943b	43 mice	Swiss	F	0.6% in benzene every 2 weeks	--do--	Ca. 100%	---	Ca. 8 mos.
	44 mice	--do--	F	0.6% in benzene every 3 weeks	--do--	--do--	---	--do--
	48 mice	--do--	F	0.6% in benzene every 4 weeks	--do--	--do--	---	Ca. 8½ mos.
	Mice	--do--	F	0.6% in benzene thrice weekly for 14 weeks	--do--	--do--	---	Ca. 6 mos.
	Mice	--do--	F	0.3% in benzene thrice weekly for 14 weeks	--do--	--do--	---	Ca. 7 mos.
	Mice	--do--	F	1% in benzene thrice weekly for 14 weeks	--do--	--do--	---	Ca. 6 mos.
	20 mice[6]	--do--	F	0.6% in benzene thrice weekly for 4 weeks	--do--	9 sarc. and carc.	---	Ca. 11 mos.
	--do--	--do--	F	0.6% in benzene thrice weekly for 2 weeks	--do--	--do--	---	--do--
	34 mice[6]	--do--	F	0.6% in benzene thrice once every 3 weeks	--do--	14 sarc. and carc.	---	--do--
	14 mice[6]	--do--	F	0.6% in benz · once	--do--	6 sarc. and carc.	---	--do--
	291 mice[6]	--do--	F	0.3-1% in benzene, different methods of application	--do--	228 carc.[7]	---	---
Furth and Boon, 1943	37 mice	Rf/Ak	---	0.5% in benzene twice weekly	Skin	6[8]	14 alive at 10 mos.	At least 16 mos.
	36 mice	--do--	---	--do--[9]	--do--	23[8]	10 alive at 10 mos.	--do--
Hill et al., 1943	43 rats	Yale	M & F	1 or 3 mg. in corn oil[10]	I.M.	34[11]	---	181 days
	Rats	--do--	--do--	3 mg. in corn oil	I.M.	9[12]	---	Over 260 days

1. Mostly spindle-cell sarcoma. 10% were rhabdomyosarcoma and epidermoid sarcoma. A few lung tumors and mammary adenocarcinomas. Mesenteric metastases in 2 animals.
2. Mean induction time 69 - 146 days. Spindle-cell sarcoma and rhabdomyosarcoma, chiefly; a few epidermoid carcinomas and an anaplastic sarcoma; also 22 lung tumors (none in CBA), 12 mesenteric metastases and 8 papillomas.
3. Sometimes only single paintings were done.
4. 5 carcinomas and one sarcoma.
5. First tumor in 3rd month.
6. Effective total.
7. Also sarcoma and papillomas.
8. With leukemia.
9. Also irradiated with x-ray before painting.
10. Animals subjected to different influences lowering their body temperature.
11. Fibrosarcoma; first at 90 days; one animal with metastases.
12. Fibrosarcoma.

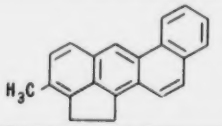
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Kline et al., 1943	60 mice	---	M & F	0.2% in dioxane twice weekly for 24 mos.[1]	Skin	Tumors[2]	---	---
	50 mice	---	--do--	0.2% in dioxane twice weekly for 5 mos.[1]	--do--	Tumors[3]	---	---
Lavik and Baumann, 1943	525 mice	---	---	0.2% in dioxane twice weekly for 2 mos.[4]	Skin	24-78%[5]	---	5 and 6 mos.
	53 mice[6]	---	---	0.02 mg. in corn oil	S.C.	17%[6]	---	7 mos.
	29 rats	---	---	1 or 2 mg. in corn oil	S.C.	50-62%[7]	---	10 mos.
	93 mice[6]	---	---	0.2% in dioxane twice weekly for 2 mos.[8]	Skin	26-50%	---	5 mos.
	407 mice[6]		M & F	0.2% in dioxane twice weekly for 2 mos.[9]	--do--	4-50%	---	6 mos.
	92 mice[6]		---	--do--[10]	--do--	26-66%	---	5 mos.
	161 mice[6]		---	0.2% in dioxane twice weekly for 10 weeks[11]	--do--	0-66%	---	6 mos.
Simpson and Cramer, 1943a	30 mice	Swiss	M & F	0.5 mg. in lanolin	Skin	0	26 alive at 8 mos.	8 mos.
	50 mice	--do--	--do--	0.2 mg. in lanolin thrice weekly for 14 weeks	--do--	3 pap.[12]	47 alive at 14 weeks	26 weeks
	60 mice	--do--	--do--	--do--	--do--	0	---	18 weeks
Simpson and Cramer, 1943b	12 mice	New Buffalo	---	0.6% in benzene, 1 application	Skin	2 carc.[13], 1 sarc.	---	At least 11 mos.
Stewart and Lorenz, 1943	Mice	C3H, A, C, C57 Bl., I, and Dba	M & F	0.2-0.8 mg. in mineral oil, lard, horse serum, impregnated cotton thread	Stomach wall	Tumors[14]	---	At least 46 weeks
Strong, 1943	112 mice	9mO	M & F	1 mg. in sesame oil	S.C.	85%[15]	---	Ca. 250 days
	1000 mice	--do--	--do--	--do--	S.C.	80%[15]	---	750 days
Strong et al., 1943	Mice	9mO	M & F	1 mg. in sesame oil	S.C.	6%[16]	---	At least 616 days
Bell and Blumstotz, 1943	10 rats[17]	---	---	Fragments of fused solid	Brain	0[18]	---	At least 188 days
White et al., 1943	40 mice	Dba	---	0.2% in ether, 20 times[19]	Skin	0[20]	---	Over 99 days
	40 mice	--do--	---	--do--[21]	--do--	0[22]	---	Over 101 days
	--do--	--do--	---	--do--[23]	--do--	0[23]	---	Over 127 days

1. Some also received pyridoxine added to diet.
2. 83% of those on high pyridoxine diet; 20% of those on low pyridoxine diet.
3. 62% of those on high pyridoxine diet; 36% of those on low pyridoxine diet.
4. Several different groups received dietary treatment.
5. Of effective total.
6. Effective total.
7. In 7 months.
8. Painting with carcinogen alternated with painting of different fatty substances.
9. Also fed emulsion of fatty substances in drinking water.
10. Also fed various metabolic derivatives of fats.
11. Animals on different caloric intake.
12. Beginning at 23 weeks.
13. Metastases to lymph nodes.
14. Adenocarcinoma of glandular stomach; also other tumors.
15. Also mammary tumors in females.
16. 5 adenocarcinomas of the stomach; one squamous-cell carcinoma of the fore-stomach; also 9 adenomas of the pyloric, 5 squamous-cell papillomas (pyloric); also spindle-cell sarcoma at site; also adenocarcinoma of the lung.
17. Alive at 5 months.
18. Two intracranial epithelial cysts.
19. Animals on dog chow.
20. 36 leukemias.
21. Animals on high cystine diet.
22. Animals on low cystine diet.
23. 4 leukemias.

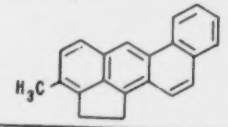
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Biesele and Cowdry, 1944	45 mice	New Buffalo Swiss & CBA	---	0.6% in benzene, single or repeated applications	Skin	3 pap., 7 carc.	---	Up to 169 days
Carruthers and Suntzeff, 1944	Mice	---	---	12 applications	Skin	Carc.[1]	---	30 days
	--do--	---	---	24 applications	--do--	--do--	---	60 days
Castellano and D'Amour, 1944	179 rats	U. of Denver	M & F	20% paraffin pellets, 10 mg. total dose[2]	Uterus, ovaries, testes, seminal vesicles & prostate	41[3]	---	1 year
Cooper et al., 1944	2 mice	Swiss	F	0.3% in acetone, thrice weekly for 98 days	Skin	2 carc.	---	Ca. 16 weeks
	1 mouse	Swiss	F	0.3% in benzene, thrice weekly for 96 days	Skin	1 carc.	---	Ca. 13 weeks
Cowdry and Suntzeff, 1944	97 mice	New Buffalo	M	0.13 mg. in benzene thrice weekly	S.C.	Tumors	---	9 mos.
	92 mice	CBA	M	--do--	--do--	--do--	---	--do--
Cramer and Simpson, 1944	Mice	Swiss	F	0.6% in benzene, every 3 weeks, 5 doses	Skin	Cancer[4]	---	Over 9 mos.
	--do--	--do--	F	in lanolin, for 14 weeks, then 0.6% in benzene	--do--	Cancer[5]	---	--do--
von Euler et al., 1944	10 rats	Norman	---	12 mg. in glycerin	Inj.	4[6]	---	At least 5 mos.
Friedewald and Rous, 1944a	9 rabbits	---	---	0.3% in benzene, twice weekly for 180 days	Skin	3 carc.[7]	---	Up to 3 years
	4 rabbits	---	---	0.3% in ether containing 2% mineral oil, twice weekly for 8 mos.	--do--	0[7]	---	Over 8 mos.
Kaplan and Kirschbaum, 1944	28 mice	Dba	---	0.5% twice weekly[8]	Skin	14[9]	4 died	Over 127 days
	63 mice	Dba	---	0.5% twice weekly	--do--	38[9]	---	Over 114 days
	Mice	F	---	0.5% twice weekly[8]	--do--	2[9]	21 alive at 100 days	Over 100 days
	39 mice	F	---	0.5% twice weekly	--do--	12[9]	20 alive at 190 days	190 days
Kirschbaum et al., 1944	58 mice	Dba	F	0.5% in benzene twice weekly	Skin	31[10]	---	At least 205 days
	48 mice	Dba	F	--do--	--do--	0[11]	---	At least 205 days
Kirschbaum and Kaplan, 1944	122 mice	F	M & F	0.5% soln. of benzene twice weekly	Percutaneously	0	---	At least 120 days
	55 mice	A	--do--	--do--	--do--	0	---	--do--
	17 mice	Dba	--do--	--do--	--do--	0	---	--do--
	97 mice	--do--	--do--	--do--	--do--	0	---	--do--

1. Epidermoid.
2. Some also received doses of hormones.
3. In uterus (22), ovaries(11), seminal vesicles(8), and prostate (17). 2 tumors in testis.
4. Of the skin in Ca. 50% of animals.
5. Of the skin in over 50% of animals.
6. In 4 to 5 mos.
7. First at 12 weeks; benign tumors present.
8. Received also x-radiation.
9. Leukemia.
10. Mammary cancer also leukemia in 27 animals.
11. Mammary cancer also leukemia in 31 animals.

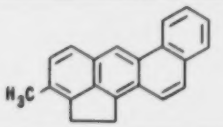
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Kline and Rusch, 1944	25 mice	ABC	---	0.3% in benzene, twice weekly for 8 weeks[1]	Skin	1 carc.,	---	4 mos.
	--do--	C	---	0.2% in benzyl alcohol, twice weekly for 16 weeks[1]	--do--	5 carc., 7 pap.	---	6 mos.
Lacassagne et al., 1944a	10 mice	XVII	M & F	0.5% 1 drop in benzene thrice weekly	Skin	Pap.[2]	---	171 days
Lacassagne and Rudali, 1944	9 mice	RIII	---	0.5% in a mixture of lard, lanolin, triolein thrice weekly	Skin	8 epi.[3]	---	At least 5 mos.
	20 mice	XVII	---	0.5% in benzene	--do--)			
	--do--	--do--		0.5% in lipoid non emulsioned	--do--)			
	--do--	--do--	---	0.5% in lipoid emulsioned	--do--)	0	---	At least 1 year
	--do--	--do--		0.5% in pellets in food	P.O.)			
	--do--	RIII	---	--do--		0	---	--do--
Lacassagne and Latarjet, 1944	Mice[4]	XVII	---	0.3% in acetone 1 drop triweekly	Skin	Pap.[5]	---	At least 78 days
	Mice[6]	RIII	---	0.3% in acetone 1 drop then triweekly	--do--	Pap.[7]	---	--do--
Lawrason and Kirschbaum, 1944	49 mice	Dba	M & F	0.5% soln. in benzene twice weekly[8]	Skin	0[9]	---	At least 143 days
	48 mice	--do--	--do--	--do--[10]	--do--	0[9]	---	--do--
Mulligan, 1944b	8 dogs	Mongrel	M & F	30-140 mg. in soln. in benzene-paraffin, or in gelatin capsule	I.M.	2 sarc.	---	150-735 days
Orr, 1944	29 mice	IF	F	0.5% in sweet almond oil, every 14 days	Intranasal	Tumors[11]	26 alive at 4 mos.	At least 4 mos.
	18 mice	IF	M	--do--	--do--	0	---	---
	22 mice	CBA	F	--do--	--do--	Tumors[12]	6 alive at 8 mos.	At least 8 mos.
	35 mice	--do--	M	--do--	--do--	Tumors[13]	24 alive at 8 mos.	--do--
	34 mice	IF	M	--do--	--do--	--do--[14]	16 alive at 5 mos.	After 5 mos.
Peacock and Kirby, 1944	24 mice	Stock		0.4% in olive oil in food	P.O.	5 pap.[15]	---	509 days
Roussy et al., 1944b	8 rats	---		1 cc. oily soln. once	S.C.	Tumors[16]	---	At least 7 mos.

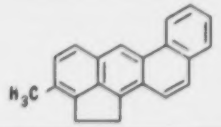
1. Other mice given subsequent treatment with chemical or physical trauma with effect on tumor incidence.
2. In 3rd. week. 2 at 3½ mos.
3. Two with gastric cancer after 146 days.
4. U.V. irradiation 10 days before first painting.
5. First at 78 days.
6. Irradiated day before first painting.
7. First papilloma at 50 days then turned to epithelioma.
8. High fat diet.
9. Leukemia.
10. Low fat diet.
11. 18 with mammary cancer.
12. 4 with mammary cancer.
13. 1 with mammary cancer.
14. 11 with mammary cancer.
15. Of the forestomach.
16. With metastases.

883.--20-METHYLCHOLANTHRENE (Continued)



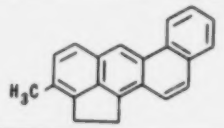
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Shimkin and Bryan, 1944	317 mice	C3H	M	0.00781-1.0 mg. in tricaprylin once	S.C.	122[1]	---	At least 6 mos.
Strong, 1944	4000 mice	NHO, NH	M & F	1 mg. sesame oil	S.C.	Tumors	---	At least 757 days
Westphal, 1944	Rats	---	---	10 mg. in oil soln.	S.C.	Sarc.	---	---
White, F. R. et al., 1944	46 mice	Dba	M & F	0.2% in ether, 25 times	Skin	37[2]	---	Over 237 days
White, J. et al., 1944	Mice	Dba	---	0.2% in ether, 20 times[3]	Skin	66[4]	110 alive at 60 days	Over 127 days
Williams and Strong, 1944	Ca. 867 mice	NHO	M & F	1 mg. in sesame oil	S.C.	694[5]	---	At least 496 days
Zimmerman and Arnold, 1944	42 mice	C3H	M & F	Pellets	Brain	34[6]	---	---
	25 mice	ABC	--do--	--do--	--do--	19[6]	---	---
	21 mice	Bagg albino	--do--	--do--	--do--	14[6]	---	---
	35 mice	C57, bl.	--do--	--do--	--do--	21[6]	---	---
	22 mice	A	--do--	--do--	--do--	6[6]	---	---
	19 mice	Dba	--do--	--do--	--do--	4[6]	---	---
	27 mice	C3H	--do--	--do--	--do--	15[6]	---	---
	29 mice	Dba	--do--	--do--	--do--	1[7]	---	---
	96 mice	C3H, dba, hybrid	--do--	--do--	--do--	41[7]	---	---
Buu-Hoï et al., 1945	10 mice	XVII	---	0.3% in acetone fortnightly for 105 days	Skin	7	---	200 days
Carruthers and Suntzeff, 1945	115 mice	New Buffalo	M & F	0.6% in benzene	Skin	Tumors	---	At least 70 days
Duran-Reynals et al., 1945	Pigeons	---	---	4 mg. in lard	I.M., breast	Sarc.[8]	---	Few mos.
	21 pigeons	---	---	10-20 mg. (total dose) in benzene, 1-20 injections	--do--	10 sarc.[9]	10 died neg.	10½ mos.
	12 guinea fowls	---	---	15 or 20 mg. (total dose) in benzene, in 2 doses	--do--	8 sarc.[10]	1 died neg.[11]	12 mos.
	45 ducks	Pekin	---	8 or 24 mg. in lard	--do--	0	---	10 mos.
	7 ducks	--do--	---	10 mg. in benzene, 4 times over 6 mos.	--do--	1 sarc.[12]	---	12 mos.
	10 turkeys	---	---	2-30 mg. (total dose) in benzene, in 1-3 injections	--do--	0	---	10 mos.

1. Mostly sarcomas, some with muscle-cell elements; 3 carcinomas.
2. Leukemia; 4 carcinomas; one fibrosarcoma; reduction in number with caloric restricted diet.
3. Animals on different diets.
4. Leukemia.
5. 602 fibrosarcomas, 242 epidermoid carcinomas and small number of spontaneous neoplasms.
6. Gliomas and sarcomas (both intracranial and extracranial sarcomas).
7. Gliomas and extracranial sarcomas.
8. After a few mos.
9. Also metastases to bone and liver; first sarcoma at 2 mos. One more possible sarcoma.
10. First at 2 mos., metastases to liver.
11. Also one probable tumor that regressed.
12. In 12 mos.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
833.--20-METHYLCHOLANTHRENE (Continued) 								
Greenwood, 1945[1]	19 rats	---	---	---	Brain	6[2]	---	---
Hueper, 1945	60 rats	Albino[3]	---	0.1 to 0.5% in benzene twice weekly	Skin	0	3 alive at 11 mos.	11 mos.
	--do--	--do--	---	0.5% in benzene twice weekly	--do--	1 carc.	4 alive at 8 mos.	8 mos.
	12 rats	Albino[4]	---	--do--	--do--	0	11 alive at 8 mos.	--do--
Lacassagne and Latarjet, 1945	6 mice	XVII	---	Drop in acetone	Skin	2[5]	4 died by 104 days	At least 253 days
	--do--	--do--	---	--do--	--do--	1 pap.	---	At least 300 days
Miro-Quesada, 1945	40 mice[6]	C3H	M & F	0.5 mg. in sesame oil	S.C.	Sarc.[7]	---	Ca. 170 days
Neiman and Sinai, 1945	Mice	---	---	3 times a day 1 mg. in sunflower-seed oil[8]	---	Tumors	---	82-148 days
	--do--	---	---	--do--	---	Tumors	---	--do--
Pfeiffer and Allen, 1945	17 monkeys	Macacus Rhesus	---	26-1500 mg. (total dose)	Inj., skin, pellets, I.V. or P.O.	0	---	1/2 - 8-1/2 years
Pullinger, 1945	146 mice	Simpson, Stock, C57 bl., C57 br., & C3H	---	1/3 to 5 mg. in acetone, in single dose	Skin[9]	5[10]	119 alive at 9-12 mos.	9-12 mos.
Russell, 1945a	85 rats	Rockland	M & F	30% cholesterol pellets (avg. wt. 25 mg.)[11]	Brain	21[12]	33 died within 6 weeks[13], 42 alive at 153 days	700 days
Russell, 1945b	42 rats	--do--	--do--	--do--	--do--	Tumors[12]	---	At least 500 days
Silberberg and Silberberg, 1945a	32 mice	White Swiss	M & F	In benzene 0.3%, thrice weekly	Skin	Pap.	---	At least 3 mos.
Simpson and Cramer, 1945a	25 mice[14]	Swiss	F	0.3% in anhydrous lanolin thrice weekly for 14 weeks plus 0.6% in benzene every 3 weeks for 12 weeks	Skin	23	---	12 mos.
	50 mice[14]	--do--	F	--do--	--do--	41	---	15 mos.

1. Quoted by Russell, 1945a.
2. One spongioblastoma multiforme, 4 fibroblastic tumors; and 1 adenoma.
3. Hairless.
4. Haired.
5. One papilloma.
6. Adrenalectomized.
7. First tumor in 170 days. 2 adenocarcinomas of the mammary gland.
8. Plus different doses of ACS.
9. Skin excised from treated area.
10. 4 papillomas and one sebaceous adenoma.
11. Some animals also on diet deficient in thiamine and riboflavin.
12. Some derived from nervous tissue and some derived from connective tissue.
13. As result of operation or from infection.
14. Effective total.

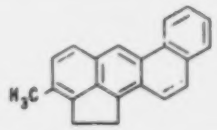
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Simpson and Cramer, 1945a (Continued)	34 mice[1]	Swiss	F	0.6% in benzene every 3 weeks for 12 weeks	Skin	16	---	9 mos.
	25 mice[1]	--do--	--do--	--do--	--do--	12	---	--do--
	27 mice[1]	--do--	--do--	0.3% in anhydrous lanolin thrice weekly for 14 weeks plus benzene thrice weekly for 18 weeks	--do--	1 pap.	---	36 weeks
Simpson and Cramer, 1945b	80 mice	Swiss	M & F	0.6% in benzene every 2 weeks	Skin	Tumors	Many killed early	6 weeks
Simpson et al., 1945	50 mice[1]	Swiss	F	0.3% in anhydrous lanolin thrice weekly for 14 weeks	Skin	1 pap.	---	26 weeks
	60 mice[1]	--do--	F	--do--	--do--	0	---	16 weeks
	99 mice[1]	--do--	F	--do--	--do--	2 carc.[2]	---	42 weeks
	103 mice[1]	--do--	F	--do--	--do--	0	---	16 weeks
Strong, 1945a	Mice	NHO	---	1 mg. in sesame oil	S.C.	Tumors[3]	---	At least 240 days
Strong, 1945b	Mice	NHO	---	1 mg. in sesame oil	S.C.	Tumors[3]	---	---
Strong, 1945c	Mice	--do--	---	--do--	--do--	--do--	---	---
Strong, 1945d	4000 mice	NH and NHO	M & F	--do--	--do--	Tumors[5]	---	960 days
Strong, 1945e	Mice	NHO	---	--do--	S.C.	Tumors	---	---
Strong, 1945f	125 mice	--do--	F	--do--	S.C.	75[4]	---	At least 700 days
Suntzeff et al., 1945b	366 mice	New Buffalo and CbA	M & F	0.6% in benzene 3-48 times	Skin	Tumors	---	10-120 days
Tannenbaum, 1945b	437 mice[1]	C3H	M	0.3% in acetone, 1 drop weekly for 10 weeks	Skin	16-78% pap.	165 alive at 55 weeks	55 weeks
Wicks and Suntzeff, 1945	Mice	New Buffalo	M & F	0.6% in benzene, single and multiple applications	--do--	Tumors	---	60 days
Woglom, 1945	Mice	RIII	M & F	0.6% in benzene thrice weekly	--do--	7 pap.[6]	---	At least 114 days
Carruthers and Suntzeff, 1946	57 mice	New Buffalo and Swiss	--do--	0.6% in benzene every 2 days	--do--	0	---	Up to 31 days
Eisen, 1946	25 rats	Aug, Sherman Wistar	--do--	1 mgm. in pellet	S.C.	7 sarc.	21 alive at 248 days	At least 248 days

1. Effective total.
2. First at 14 weeks.
3. 4 types of malignant gastric tumors.
4. Mammary tumors.
5. Local tumors and lung tumors; 231 stomach (pyloric) lesions including 186 adenocarcinomas.
6. First at 70 days.

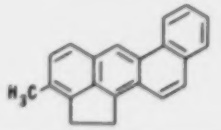
883.--20-METHYLCHOLANTHRENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Lacassagne and Latarjet, 1946	10 mice[1]	---	---	0.5% in acetone thrice weekly[2]	Skin	Epi.[3]	---	At least 120 days
	8 mice[1]	---	---	0.3% in acetone thrice weekly for 15 days	--do--	--do--	---	At least 290 days
	9 mice[4]	---	---	0.3% in acetone thrice weekly	--do--	--do--	---	At least 180 days
	6 mice[4]	---	---	--do--	--do--	--do--	---	--do--
de Luca and Trojaniello, 1946	20 rats	White	---	0.3 cc. in oil 0.5% every 20 days	S.C.	Sarc.[5]	All killed at 5 mos.	6 mos.
Lewis and King, 1946	267 rats	Varied	M & F	1-4 mg. in olive oil	S.C.	Sarc	All alive at 295 days	At least 295 days
Mulligan et al., 1946	7 dogs	Mongrel	M	100 mg. in capsules	Brain	3[6]	---	378-436 days
Orr, 1946	57 mice	IF	F	0.5% sweet almond oil (1.25 mg.) every 2 weeks	S.C.	30[7]	---	At least 170 days
	12 mice	--do--	F	0.5% in arachis oil every 2 weeks	I.P.	1[8]	All dead at 102 days	---
Silberberg, M. and Silberberg, R., 1946	64 mice	RFI	M & F	0.3% in benzene	Skin	1 pap.	Killed at 10-45 days	3 mos.
Strong, 1946	1916 mice	NHO and 2NHO	---	1 mg.	S.C.	36-92%[9]	---	500 days
Strong et al., 1946	57 mice	C3H	---	1 mgm. in sesame oil	S.C.	Tumors	---	Ca. 120 days
Stowell and Mias, 1946	50 mice	Swiss	F	1.0% in benzene 3-9 times weekly	Skin	Carc. and sarc.	---	At least 14 weeks
Tatum et al., 1946	Mice	Swiss	F	0.6% in benzene, 1-25 times	Skin	0	---	10-60 days
Dunning et al., 1947a	15 rats	AXC	F	3 mg. in pellets	S.C.	0	---	At least 529 days
	Rats	Fisher	F	--do--	--do--	0	---	At least 257 days
	17 rats	AXC	M	--do--	--do--	10[10]	---	329 days
	9 rats	Fisher	M	--do--	--do--	1	241 days	241 days
Figge, 1947	182 mice	Stock	---	0.25 mg.	Inj.	Tumors	---	60-80 days
Greenblatt et al., 1947	30 rats	White	---	10-50 mg.	S.C.	Sarc.	---	8-12 mos.

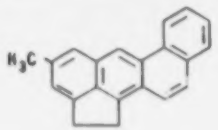
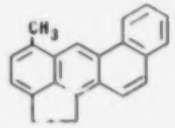
1. Infants.
2. Plus irradiation with ultraviolet rays.
3. Epidermoid.
4. Adult.
5. Fuso-cellular and polymorphocellular; first at 100 days.
6. Extracerebral fibrosarcoma, a glioma and a sarcomatous meningioma.
7. Mammary carcinoma with lung metastases in 2; one with papillomas of skin.
8. Mammary carcinoma.
9. Fibrosarcoma, epidermoid carcinoma, rhabdomyosarcoma and a few carcinomas of the mammary gland.
10. Squamous cell carcinoma.

883.--20-METHYLCHOLANTHRENE (Continued)

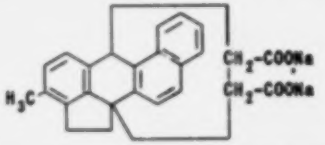
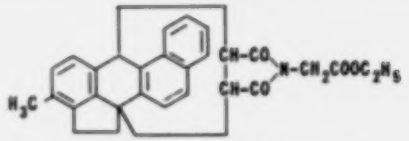
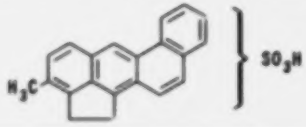
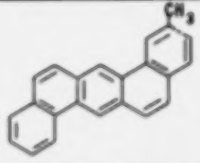


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Horning and Mochowski, 1947	58 mice	Strong A	---	0.1 cc. of 1.5% solution warm lard	Prostate	32 sarc. and carc.	---	Ca. 4.8 mos.
	52 mice	R111	---	--do--	--do--	17 sarc.	---	Ca. 7 mos.
Kirschbaum et al., 1947	169 mice[1]	Varied	---	0.25% in benzene thrice weekly	Skin	22[2]	---	At least 320 days
	227 mice[3]	--do--	---	--do--	--do--	48[2]	---	At least 507 days
Locatelli, 1947	Rats	---	---	20 mg. in lard	S.C.	0	---	5 days to 4 mos.
	Rabbits	---	---	--do--	--do--	0	---	--do--
Orr, 1947b	298 mice	Varied	---	0.5% in almond oil	Intranasal	124[4]	---	---
	41 mice	IF	---	--do--	--do--	17[4]	---	---
Shimkin and Wyman, 1947	201 mice	C3H	M	0.002-0.5 mg. in cholesterol pellets	S.C.	83 sarc.[5]	---	Ca. 24 mos.
Silberberg, M. and Silberberg, R., 1947a	32 guinea pigs	---	M	0.5% in benzene thrice weekly	Skin	0	---	2-3 mos.
Silberberg, M. and Silberberg, R., 1947b	16 guinea pigs	---	---	5% solution in benzene for 5 mos.	Skin	0	---	At least 3 mos.
	32 guinea pigs	---	---	--do--	--do--	0	---	--do--
Strong and Hollander, 1947	27 mice	A	F	1 mg. in 0.1 cc. sesame oil	I.P.	11[6]	9 alive at 1 year	At least 1 year
	16 mice	C3H	F	--do--	--do--	7	5 alive at 1 year	--do--
	18 mice	JK	F	--do--	--do--	5	6 alive at 1 year	--do--
	8 mice	C57	F	--do--	--do--	1	--do--	--do--
	2 mice	L	F	--do--	--do--	2	0	--do--
	5 mice	I	F	--do--	--do--	0	1 alive at 1 year	--do--

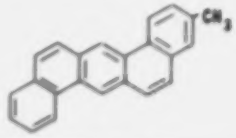
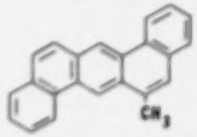
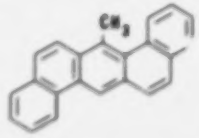
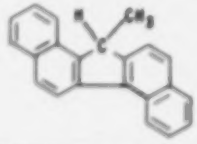
1. Without milk agent.
2. Mammary cancer.
3. With milk agent.
4. Pulmonary adenoma.
5. Average latent time from 5.1-7.7 months.
6. Mammary and other tumors.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
884.--22-METHYLCHOLANTHRENE 								
Bradbury et al., 1941	11 mice	Inbred	---	2 mg. in sesame oil	S.C.	6 sarc.[1]	All died in 4 mos.	4 mos.
Law and Lewisohn, 1941	29 mice[2]	C	M & F	1 mg. in olive oil	S.C.	26 sarc.[3]	---	23 weeks
885.--23-METHYLCHOLANTHRENE 								
Bradbury et al., 1941	16 mice	Inbred	---	2 mg. in sesame oil	S.C.	7 sarc.	4 alive neg. at 6 mos.	6 mos.
Law and Lewisohn, 1941	28 mice[2]	C	M & F	1 mg. in olive oil	S.C.	20 sarc.[4]	---	23 weeks
886.--20-METHYLCHOLANTHRENE CHOLEIC ACID[5]								
Shear, 1936a	11 mice	A	---	10 mg. crystals	S.C.	10[6]	1 animal killed	125 days
	6 mice	A	---	0.25% aq. soln. as Na salt, 0.5 cc.	--do--	6[7]	---	6 mos.
	--do--	D	---	--do--	--do--	2[8]	---	7 mos.
Menkin[9]	Rabbits	---	---	In aq. soln., repeated injections	I.V.	0	---	---
Briggs, 1940	154 tadpoles	Rana Pipiens	---	Ca. 0.2 mg. crystals in lard	S.C.	3[10]	---	---
Shear, 1941	11 mice	A	---	10 mg. crystals	S.C.	9	---	4 mos.
	6 mice	D	M	0.25% aq. soln. as the Na salt, 0.5 cc.	S.C.	4	---	1 year
	--do--	A	---	--do--	--do--	6	---	9 mos.
Shear and Leiter, 1941a	11 mice	A	---	10 mg. crystals	S.C.	10[11]	---	4 mos.
	12 mice	A & dba	M & F	1.25 mg. in aq. soln. as Na salt, 4 injections	S.C.	8[12]	---	1 year
	35 mice	A	M & F	0.3 - 1.25 mg. in aq. soln. as Na salt, several injections	I.V. & I.P.	4[13]	14 died in 6 mos., 5 neg. alive at 1 year	15 mos.
Carruthers, 1942	Mice	C57 bl.	---	1 mg. in aq. soln. pH8, twice weekly	S.C.	Sarc.**	---	14 weeks

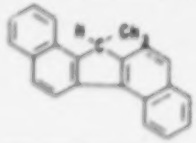
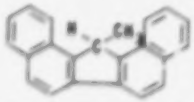
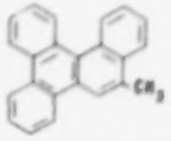
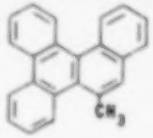
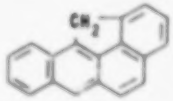
1. Also carcinomas.
2. Effective total.
3. First at 9 weeks. Mean latent period 13.3 weeks. 92.3% with lung tumors.
4. First at 10 weeks. Mean latent period 15.8 weeks. 69% with lung tumors.
5. Methylcholanthrene to desoxycholic acid in the molecular ratio of 1:4.
6. First at 62 days; ½ of animals with tumors in 72 days.
7. First at 93 days.
8. First at 5 mos.
9. Unpublished results cited by Shear, 1938a.
10. Out of 12 retaining the injected mass. First at 95 days. Of these, one (at 119 days) showed definite signs of malignancy.
11. First at 3 mos; all in 4 mos.
12. First at 4 mos.
13. I.P.; several with lung tumors; one with tumor in abdomen.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
887.--20-METHYLCHOLANTHRENE PICRATE[1]								
Seligman and Shear, 1941	15 mice	A	F	5 or 10 mg. crystals	S.C.	7	7 died in a few hrs.	4.5 mos.
888.--20-METHYLCHOLANTHRENE-endo-α,β-SUCCINIC ACID, SODIUM SALT 								
Parsons, 1938	Mice	---	---	In aq. soln.[2]	---	Sarc.	---	---
Parsons and Warren[3]	Mice	---	---	---	Inj.	Tumors[4]	---	---
889.--20-METHYLCHOLANTHRENE-endo-α,β-SUCCINYL GLYCINE ETHYL ESTER 								
Bradbury et al., 1941	16 mice	Inbred	---	5 mg. in sesame oil	S.C.	8 sarc.[5]	All dead at 7 mos.	7 mos.
890.--20-METHYLCHOLANTHRENE-SULFONIC ACID 								
Rossner, 1937	---	---	---	---	---	0	---	---
891.--20-METHYLCHOLANTHRENE-TRINITROBENZENE[6]								
Seligman and Shear, 1941	10 mice --do--	A A	F F	10 mg. crystals 1.5 mg. crystals	S.C. S.C.	9 6	--- ---	3 mos. 5 mos.
892.--2'-METHYL-1,2,5,6-DIBENZANTHRACENE 								
Cook, 1932b	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	5 epi.	14 alive at 6 mos., 12 alive at 1 year	730 days

1. Methylcholanthrene to picric acid in the molecular ratio 1:1.
2. Called in this paper "Sodium 5-methylcholanthrene-6,12b-endo-α,β-succinate."
3. Cited by Cook and Kennaway, 1940.
4. Of connective tissue.
5. First at 3 mos.
6. Methylcholanthrene to 1,3,5-trinitrobenzene in the molecular ratio 1:1.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
893.--3'-METHYL-1,2,5,6-DIBENZANTHRACENE 								
Kennaway, 1930	10 mice	---	---	Less than 0.5%[1] in benzene	Skin	4 pap.	---	---
Kennaway and Hieger, 1930	10 mice	---	---	---	--do--	--do--	---	285 days
Cook et al., 1952b	20 mice	Stock	---	0.5%[2] in benzene twice weekly	Skin	2 epi.[2]	12 alive at 6 mos., 7 alive at 1 year	631 days
	--do--	--do--	---	0.5%[3] in benzene twice weekly	--do--	5 epi., 1 pap.	19 alive at 6 mos., 7 alive at 1 year	503 days
	--do--	--do--	---	--do--	--do--	1 epi.	6 alive at 6 mos., 1 alive at 1 year	407 days
894.--6-METHYL-1,2,5,6-DIBENZANTHRACENE 								
Barry et al., 1955	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	4 epi., 1 pap.	9 alive at 6 mos.	291 days
895.--9-METHYL-1,2,5,6-DIBENZANTHRACENE 								
Shear and Leiter, 1960	20 mice	A	M & F	2 mg. crystals	S.C.	16[5]	All dead in 34 mos.	34 mos.
896.--9-METHYL-1,2,5,6-DIBENZFLUORENE 								
Berenblum, unpub. results[6]	15 mice	inbred	F	0.5% in benzene twice weekly[7]	Skin	0	8 alive at 37 weeks	65 weeks

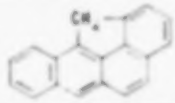
1. Substance not specially pure.
2. First tumor appeared in 161 days; average time of appearance 585 days. Data on less pure preparations not included.
3. M.p. 241-244°.
4. M.p. 245°.
5. First early in 3rd month.
6. Preliminary report of results in 24th Ann. Rep., Brit. Emp. Cancer Camp.
7. M.p. 144° C.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
896.--9-METHYL-1,2,5,6-DIBENZFLUORENE (Continued) 								
Berenblum, unpub. results[1] (Continued)	14 mice	Hvt.	M	2 mg. in 0.2 ml. tricaprylin	S.C.	0	8 alive at 54 weeks	64 weeks
897.--9-METHYL-1,2,7,8-DIBENZFLUORENE 								
Berenblum, unpub. results[1]	15 mice	Stock	F	0.5% in benzene twice weekly[2]	Skin	0	8 alive in 58 weeks	65 weeks
	12 mice	--do--	M	1 mg. in 0.2 ml. tricaprylin	S.C.	0	High mortality	5 mos.
898.--9-METHYL-1,2,3,4-DIBENZOPHENANTHRENE 								
Harris and Bradsher, 1946	32 mice	New Buffalo	---	250 mg. in sesame oil	S.C.	0	---	At least 60 weeks
899.--10-METHYL-1,2,3,4-DIBENZOPHENANTHRENE 								
Harris and Bradsher, 1946	30 mice	New Buffalo	---	5 mg. in sesame oil	S.C.	0	---	At least 60 weeks
900.--1',9-METHYLENE-1,2-BENZANTHRACENE 								
Dunlap and Warren, 1946	15 mice	C3H	M & F	1.0 mgm. once in tricaprylin	S.C.	0[3]	14 alive at 6 mos.	At least 6 mos.
	--do--	Swiss	--do--	--do--	S.C.	0	10 alive at 6 mos.	--do--
	5 mice	C3H	--do--	2.0 mgm. once in tricaprylin	S.C.	0	5 alive at 6 mos.	--do--
	--do--	Swiss	--do--	--do--	S.C.	0	2 alive at 6 mos.	--do--

1. Preliminary report of results in 24th Ann. Rep., Brit. Emp. Cancer Camp.
2. m.p. 175° C.
3. One mouse with pulmonary adenoma, hepatic adenoma and benign hemangioma of rump in 559 days.

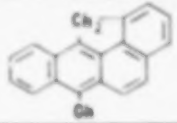
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

900.--1',9-METHYLENE-1,2-BENZANTHRACENE (Continued)



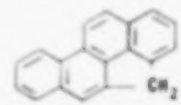
Dunlap and Warren, 1946 (Continued)	10 mice	C3H	M & F	2.0 mgm. once in glycerin	S.C.	0	1 alive at 6 mos.	At least 6 mos.
	5 mice	Swiss	--do--	--do--	S.C.	0	1 alive at 6 mos.	--do--

901.--1',9-METHYLENE-1,2-BENZ-10-ANTHRANOL



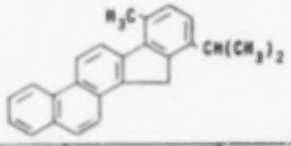
Dunlap and Warren, 1946	10 mice	Swiss	M & F	1.0 mgm. once in tricaprylin	S.C.	0[1]	3 alive at 6 mos.	At least 6 mos.
	5 mice	--do--	--do--	4.0 mgm. once in tricaprylin	S.C.	0	5 alive at 6 mos.	--do--
	15 mice	C3H	--do--	2.0 mgm. once in tricaprylin	S.C.	0	10 alive at 6 mos.	--do--

902.--4,5-METHYLENECHRYSENE



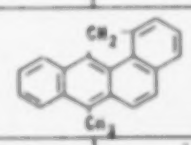
Dunlap and Warren, 1943	20 mice	C3H	M	2 mg. in tricaprylin	S.C.	4 sarc.[2]	---	Over 235 days

903.--5-METHYL-8-ISOPROPYL-2',1'-NAPHTHO-1,2-FLUORENE



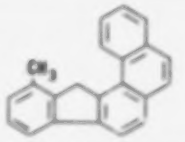
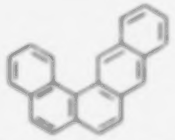
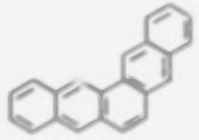
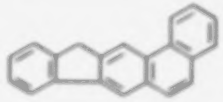
Bachmann et al., 1957	20 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	9 alive at 6 mos., 6 alive at 1 year	636 days

904.--10-METHYL-1',9-METHYLENE-1,2-BENZANTHRACENE

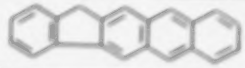
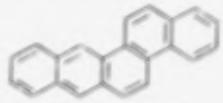
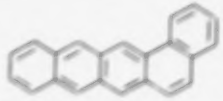
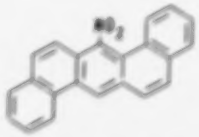


Dunlap and Warren, 1946	15 mice	Swiss	M & F	1.0 mgm. once in tricaprylin	S.C.	1[3]	2 alive at 441 days	---
	5 mice	--do--	--do--	2.0 mgm. once in tricaprylin	--do--	2[4]	5 alive at 231 days	---
	20 mice	C3H	--do--	--do--	--do--	7[5]	19 alive at 149 days	---

1. One mouse with pulmonary adenoma in 608 days.
2. First at 163 days.
3. One mouse with pulmonary adenoma in 519 days.
4. One mouse with lymphoma in 330 days. Average time of induction 258 days.
5. Average time of induction 218 days.

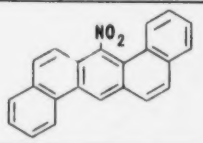
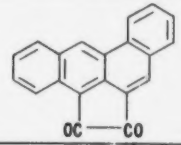
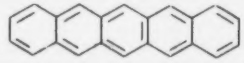
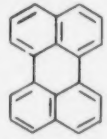
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
905.--8-METHYL-2',1'-NAPHTHO-1,2-FLUORENE 								
Bachmann et al., 1937	20 mice	mut.	---	0.5% in benzene twice weekly	Skin painting	0	18 alive at 6 mos., 10 alive at 1 year	562 days
906.--1,2-(1',2'-NAPHTH)-ANTHRACENE 								
Badger et al., 1941	31 mice	Strain	---	0.5% in benzene twice weekly	Skin	0	---	544 days
Cook et al., 1942a	Mice	---	---	---	Skin	0	---	---
907.--2',3'-NAPHTH-1,2-ANTHRACENE 								
Hennessy, 1950	40-50 mice	---	---	1% in benzene[1]	Skin	0	14 alive at 6 mos., 3 alive at 1 year	561 days
Cook et al., 1952b	40 mice	Strain	---	0.5% in benzene twice weekly	--do--	0	14 alive at 6 mos., 3 alive at 1 year	561 days
908.--1',2'-NAPHTHO-2,3-FLUORENE 								
Bachmann et al., 1937	5 mice	Strain	---	0.5% in benzene twice weekly	Skin	0	4 alive at 6 mos., 4 alive at 1 year	566 days
Badger et al., 1940	--do--	--do--	---	--do--	--do--	0	---	885 days

1. Not specially purified.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
909.--2',3'-NAPHTHO-2,3-FLUORENE 								
Berry et al., 1955	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	---	2 alive at 6 mos.	251 days
910.--2',3'-NAPHTHO-1,2-PHENANTHRENE 								
Cook et al., 1932b	6 mice	Stock	---	0.15% in benzene twice weekly	Skin	0	4 alive at 6 mos., 2 alive at 1 year	478 days
911.--2',3'-NAPHTHO-2,3-PHENANTHRENE 								
Cook et al., 1932b	5 mice ---do--- 10 mice	Stock ---do--- ---do---	--- --- ---	0.25% in benzene twice weekly 0.5% in benzene twice weekly[1] ---do---	Skin ---do--- ---do---	0 0 0	1 alive at 6 mos., 5 alive at 1 year[1] 4 alive at 6 mos. 8 alive at 6 mos., 1 alive at 1 year	527 days 340 days 515 days
912.--5-NITRO-3,4-BENZPYRENE[2]								
Windaus and Hornemann, 1937	---	---	---	---[3]	---	0	---	---
913.--3-NITRO-1,2,5,6-DIBENZANTHRACENE 								
Berry et al., 1955	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	6 alive at 6 mos., 4 alive at 1 year	538 days

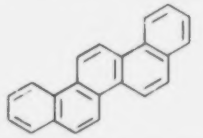
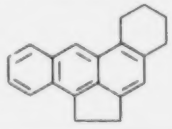
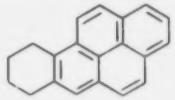
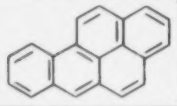
1. Then brought up to 5 animals.
2. M.P. 256-259°.
3. M.P. 250.5°-251°.

Position of nitro group indicated by Fieser and Hershberg, 1939 and by Schmidt, 1940.

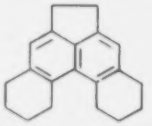
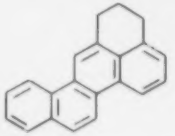
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
913.--9-NITRO-1,2,5,6-DIBENZANTHRACENE (Continued) 								
Cook, 1932b	10 mice	---	---	0.3% in benzene twice weekly	Skin	0	4 alive at 1 year	438 days
914.--OCTAHYDRO-1,2,5,6-DIBENZANTHRACENE $C_{22}H_{22}$								
Cook, 1932b	10 mice	Stock	---	0.3%[1] in benzene twice weekly	Skin	1 pap.	7 alive at 6 mos., 3 alive at 431 days	431 days
915.--4,10-OXALYL-1,2-BENZANTHRACENE 								
Dansi et al., 1938	11 rats	Albino	---	4 mg. suspended in glycerol	Inj.	0[2]	---	14 mos.
916.--PENTACENE 								
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	6 alive at 6 mos., 4 alive at 1 year	553 days
	4 mice	--do--	---	--do--	--do--	0	2 alive at 6 mos.	313 days
917.--PERYLENE 								
Kennaway, 1930	Mice	---	---	In benzene	Skin	0	---	---
Cook et al., 1932b	20 mice	Stock	---	1% in benzene twice weekly	--do--	0	14 alive at 6 mos., 7 alive at 1 year	790 days
Rondoni, 1937	20 rats	---	---	0.01 g. in lard, repeated injections	S.C.	0	---	4 mos.

1. M.P. 188-190°.

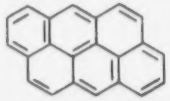
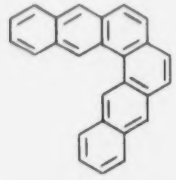
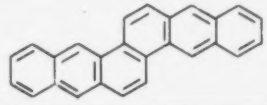
2. In 4 animals nodules which regressed in 2 to 3 mos.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
918.--PICENE 								
Kennaway, 1924a	100 mice	---	---	In sebaceous material from dermoids	Skin	0	---	---
Kennaway, 1924b	--do--	---	---	1%[1] in "90% benzol"	--do--	0	---	7 mos.
Kennaway, 1924c	Mice	---	---	---	--do--	0	---	---
Cook et al., 1932b	30 mice	Stock	---	0.5% in tetralin twice weekly	Skin	1 (?) pap.	9 alive at 6 mos., 4 alive at 1 year	438 days
	10 mice	--do--	---	0.2% in benzene twice weekly	--do--	0	6 alive at 6 mos., 2 alive at 1 year	538 days
919.--1',2',3',4'-TETRAHYDRO-4,10-ACE-1,2-BENZANTHRACENE 								
Shear, 1938a*	10 mice	A	M	5 mg. crystals[2]	S.C.	4	2 neg. alive at 12 mos.	12 mos.
Shear, 1938c	Mice	Inbred	---	---	---	Sarc.	---	---
920.--1',2',3',4'-TETRAHYDRO-3,4-BENZPYRENE 								
Schürch and Winterstein, 1935	50 mice	---	---	0.5% in benzene, three times weekly	Skin	0	---	150 days
Shear, 1937b	Mice	Inbred	---	(3)	S.C.	Tumors	---	---
Shear, 1939	22 mice	A	---	10 mg. crystals[4], repeated injections	S.C.	6	---	15 mos.
	10 mice	A	M	5 mg. crystals[4], repeated injections	--do--	01	18 alive at 12	20 mos.
	--do--	C3H	M	--do--	--do--	01	mos.	
921.--TRIBROMO-3,4-BENZPYRENE  } 3Br								
Windaus and Rennhak, 1937	---	---	---	(5)	---	0	---	---

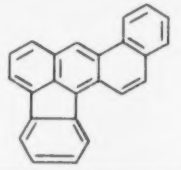
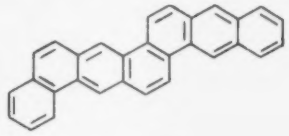
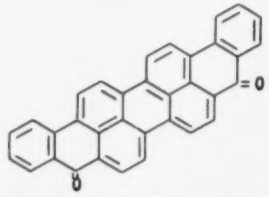
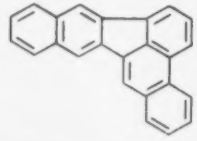
1. Very pure.
2. Possibly impure. For discussion see Fieser, 1935.
3. Substance possibly a mixture of hydro compounds.
4. M.P. 113°.
5. M.P. 298-298.5°.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
922.--5,6-TETRAMETHYLENE-1,2,3,4-TETRAHYDRO-8,9-ACEPHENANTHRENE 								
Shear and Leiter, 1941b**	10 mice	C3H	M	5 mg. crystals, repeated injections	S.C.	0	---	14 mos.
923.--1,12-TRIMETHYLENECHRYSENE 								
Shear, 1936b	24 mice	A	---	0.5%[1] in lard, 0.5 cc., repeated injections	S.C.	2[2]	14 alive at 15 mos.	15 mos.
	6 mice	M	---	10 mg. crystals[1], repeated injections	S.C.			
	7 mice	A	---	--do--	S.C.			
Shabad, 1945[3]	Mice	---	---	In oil	S.C.	Pap.[4]	---	---

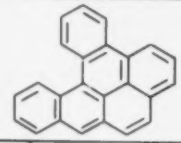
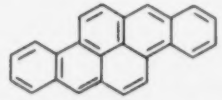
1. M.P. 116.5-117° Corr.
2. First tumor at 6 mos. One tumor possibly spontaneous, the other of questionable malignancy. Controls developed small tumors.
3. Citing unpublished work of Kleinenberg.
4. Also lung adenomas.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
924.--ANTHANTHRENE 								
Beltrami, 1935	20 mice	---	---	Saturated soln. in benzene, once every 2 or 3 days	Skin	0	---	---
Domagk, 1938	Mice (?)	---	---	In benzene, soln (?)	Skin (?)	0	---	---
Badger et al., 1940	30 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	---	712 days
Cook et al., 1940a	Mice	---	---	---	--do--	0[1]	---	---
925.--1',2'-ANTHRA-1,2-ANTHRACENE 								
Kennaway, 1930	10-20 mice	---	---	Saturated soln. in xylene[2]	Skin	0	---	---
Cook et al., 1932b	10 mice	Stock	---	0.1%[3] in benzene	--do--	0	3 alive at 6 mos., 2 alive at 1 year	477 days
	--do--	--do--	---	In xylene	--do--	0	All died in 74 days	74 days
	--do--	--do--	---	0.2% in tetralin	--do--	0	1 alive at 6 mos.	206 days
	5 mice	--do--	---	0.25% in benzene	--do--	0	4 alive at 6 mos., 3 alive at 1 year	685 days
926.--2',1'-ANTHRA-1,2-ANTHRACENE 								
Kennaway, 1930	10-20 mice	---	---	Saturated soln. in xylene[2]	Skin	0	---	---
Cook et al., 1932b	10 mice	Stock	---	In xylene[4]	--do--	0	5 alive at 6 mos.	329 days
	20 mice	--do--	---	0.2% in tetralin	--do--	0	--do--	393 days
	5 mice	--do--	---	0.25% in benzene	--do--	0	4 alive at 6 mos., 3 alive at 1 year	580 days

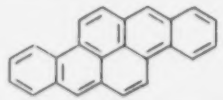
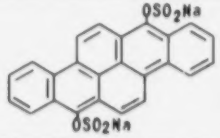
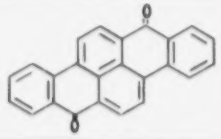
1. No liver lesions in 2 livers examined.
2. Compound not specially purified.
3. M.P. 304°.
4. M.P. 389°.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
927.--15,16-BENZDEHYDROCHOLANTHRENE 								
Shear, 1936b	14 mice	A	---	10 mg. crystals[1]	S.C.	1	9 alive at 10 mos.	11 mos.
Andervont and Shimkin, 1940	8 mice	A	---	0.25 mg. in aq. susp., single injection	I.V.	3[2]	---	20 weeks
	19 mice	A	M & F	0.5 mg. in tricaprylin	S.C.	0[3]	---	14 weeks
928.--4,5-BENZ-10,11-(1',2'-NAPHTHO)-CHRYSENE 								
Cook et al., 1932b	10 mice	Stock	---	0.2% in benzene	Skin	0	5 alive at 6 mos., 3 alive at 1 year	573 days
929.--DIBENZANTHRONE 								
Morosenskaya, 1940	32 mice	White	---	0.5% soln. in olive oil, 3-6 mg. 0.4 cc. every 10-15 days, 5 injections	S.C.	0[4]	16 alive at 6 mos.	At least 6 mos.
930.--DIBENZFLUORANTHENE 								
Domagk, 1938	Mice (?)	---	---	---	Skin (?)	0	---	---

1. M.P. 181-181.3° Corr.
2. Of the lung; first within 8 weeks.
3. No more lung tumors than in controls.
4. One lung tumor; one jaw tumor.

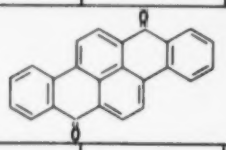
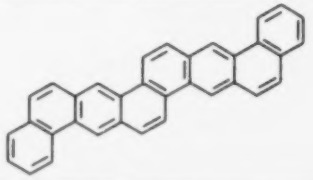
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
931.--1,2,3,4-DIBENZPYRENE 								
Bachmann et al., 1937	2 mice	Stock	---	0.3% in benzene twice weekly	Skin	1 epi.	1 alive at 6 mos.	262 days
932.--3,4,8,9-DIBENZPYRENE 								
Bachmann et al., 1937	2 mice	Stock	---	0.3% in benzene twice weekly	Skin	2 epi.	2 alive at 6 mos.	310 days
Kleinenberg, 1938	20 mice	White	M & F	6 mg.[1] in olive oil	S.C.	17[2]	18 alive at 3.5 mos.	At least 9.5 mos.
Schabad, 1938a	Mice	---	---	Soln. in olive oil	Skin	100% sarc.[3]	---	---
Kleinenberg, 1939	50 mice	P.-B.	M	0.15 to 0.18% in benzene every 2 days, 86 times	Skin	32 carc.[4]	49 alive at 3.5 mos.	At least 4.5 mos.
	24 mice	P.-B.	M & F	0.15 to 0.18% in benzene every 3 days, 55 times	---do---	11 carc.[5]	23 alive at 3.5 mos.	---do---
Shabad and Kleinenberg, 1939	Mice	P.-B.	---	---	---	32-44%[6]	---	---
Voronjansky et al., 1939	7 rats	---	---	0.1 to 0.2 mg. in sunflower-seed oil	Under periosteum	0	---	---
	4 rats	---	---	0.5-1 mg. in sunflower-seed oil	I.M.	2	---	At least 8 mos.
	24 mice	---	---	0.5 mg. in rabbit fat	S.C.	2	---	---
Badger et al., 1940	30 mice	Stock	---	0.3% in benzene twice weekly	Skin	10 epi.[7]	---	350 days
Klenitzky, 1940a	100 mice	---	F	0.23% in olive oil in cotton plugs	Cervix	0[8]	13 alive at 13.5 mos.	13.5 mos.
Klenitzky, 1940b	100 mice	White	F	0.23% in olive oil soaked into cotton tampons every 2 days for 150 days	Vagina	Tumors[9]	58 alive at 6 mos., 17 alive at 12 mos.	16 mos.
Korosteleva, 1940a	Mice	---	---	0.5% soln. 0.2 ml. three times daily for 6 days	S.C.	Sarc.	---	At least 5 mos.
Peisakhovich et al., 1940	13 mice	---	---	0.5 mg. in sunflower-seed oil, monthly	S.C.	3[10]	---	At least 6 mos.
	Mice	---	---	0.1% in sunflower-seed oil, every 5 days	Skin	0	All died	3.5 mos.

1. M.P. 303-305°.
2. Also 6 lung tumors.
3. Lung adenoma in 30% of animals.
4. First papilloma in 3.5 mos. Also 9 adenomas and one sebaceous gland adenoma. Metastases.
5. Also 3 breast tumors, 11 sebaceous gland adenomas and 8 lung adenomas.
6. Lung adenoma, as against 5-8% in controls.
7. Metastases to lung in 2 animals.
8. But a typical epithelial proliferation and metaplasia.
9. Several probably cancerous processes of the uterine neck; also one fibroma of uterus in 11 mos.
10. Adenocarcinoma.

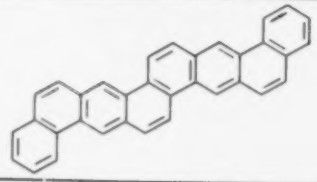
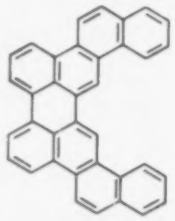
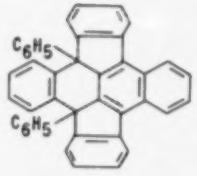
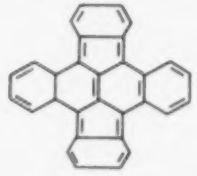
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
932.--3,4,8,9-DIBENZPYRENE (Continued) 								
Pisareva, 1940	7 rats	---	---	0.1-0.5 mg. in sunflower-seed or olive oil, once	Sub-periosteum	0	---	Ca. 12 mos.
	4 rats	---	---	--do--	Muscle	2 sarc.[1]	---	At least 8 mos.
Pisareva et al., 1940	7 rats	---	---	0.1-0.5 mg. single injection	Sub-periosteum	0	---	Ca. 12 mos.
	4 rats	---	---	1 mg. in sunflower-seed or olive oil	Sub-mucosa, stomach	0	---	---
	18 rats	---	F	0.1-0.5 mg. (total dose) in sunflower-seed oil 1-3 times	Breast	0	---	---
	6 rats	---	F	0.5 mg. in rabbit fat, once	--do--	2 sarc.[1]	---	At least 6 mos.
Sorin, 1940	18 rats	---	F	0.1-0.5 mg. (total dose) in sunflower-seed oil 1-3 times	Breast	0	---	---
	6 rats	---	F	0.5 mg. in rabbit fat, one injection	--do--	0	---	At least 6 mos.
Tretyikova, 1941	18 rats	---	M	1% in olive oil, 0.2 cc.	Testis	18 sarc.[2]	16 killed at 3 mos.	Ca. 13 mos.
	5 rats	---	---	Mixture very dilute	--do--	0	---	---
933.--3,4,8,9-DIBENZPYRENE-5,10-HYDROQUINONE SODIUM SULFITE 								
Kleinenberg, 1939	40 mice	---	M & F	0.5% in saline, 1.6 cc.	S.C.	0	33 alive at 6 mos., 9 alive at 12 mos.	12 mos.
	50 mice	---	--do--	0.4% in benzene 115 times	Skin	0	32 alive at 6 mos., 10 alive at 12 mos.	--do--
	222 mice	---	--do--	0.5% in saline 115 times	--do--	0	150 alive at 6 mos., 50 alive at 12 mos.	--do--
934.--3,4,8,9-DIBENZPYRENE-5,10-QUINONE 								
Kleinenberg, 1939	20 mice	P.-B.	M & F	0.5% in oil, 1.2 cc.	S.C.	0	18 alive at 6 mos.	12 mos.

1. At 5½ and 8 months.

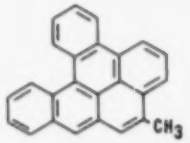
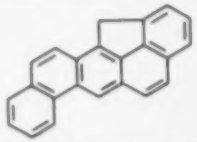
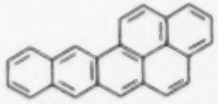
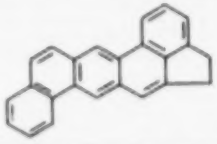
2. No metastases.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
934.--3,4,8,9-DIBENZPYRENE-5,10-QUINONE (Continued) 								
Kleinenberg, 1939 (Cont'd)	52 mice	P.-B.	M & F	0.4% in benzene, 115 times	Skin	0	30 alive at 6 mos., 10 alive at 12 mos.	12 mos.
Peisakhovich et al., 1940	10 mice	---	---	0.5 mg. in sunflower seed oil, monthly	S.C.	0	4 died	170 days
	Mice	---	---	0.1% in sunflower seed oil, every 5 days	Skin	0	All died	3.5 mos.
935.--5,10-DIHYDRO-3,4,8,9-DIBENZPYRENE (?)[1]								
Voroojansky, et al., 1939	13 rats	---	---	0.15 to 0.40 mg. in sunflower seed oil	Under periosteum	10[2]	---	At least 8 mos.
	16 rats	---	---	2.5 - 4.5 mg. in sunflower seed oil, 2 or 3 inj.	S.C.	7	---	At least 4 mos.
Ber, 1940	28 rats	---	---	1 mg. in oil, twice	Sub-mucosa stomach	1 sarc[3]	---	Ca 11 mos.
	1 dog	---	---	---	--do--	0	---	11 mos.
Peisakhovich et al., 1940	13 mice	---	---	0.5 mg. in sunflower seed oil, monthly	S.C.	3 sarc	---	At least 3 mos.
	Mice	---	---	0.1% in sunflower seed oil, every 5 days	Skin	0	All died	3.5 mos.
Pisareva, 1940	16 rats	---	---	1-4 mg. in oil, 1-3 times	Sub-periosteum	10 sarc[4]	---	At least 8 mos.
Pisareva et al., 1940	16 rats	---	---	1-4 mg., 1-3 times[5]	--do--	10 sarc[4]	3 died neg in 5 mos.	At least 8 mos.
	--do--	---	F	2.5-4.5 mg. in sunflower seed oil, in several inj.	Breast	7 sarc[6]	---	At least 6 mos.
	28 rats	---	---	1 mg. in oil, twice	Stomach	2 sarc	---	Ca 11 mos.
Sorin, 1940	16 rats	---	F	2.5-4.5 mg. (total dose) in sunflower seed oil, repeated inj.	Breast	7 sarc[6]	---	At least 6 mos.
936.--2,3,8,9-DI-(1',2'-NAPHTHO)-CHRYSENE 								
Kennaway, 1930	10-20 mice	---	---	Suspension in tetralin and in oleic acid	Skin	0	---	---

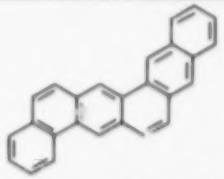
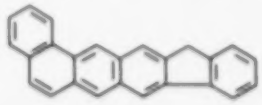
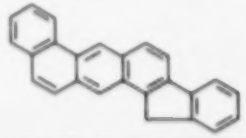
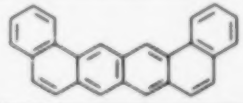
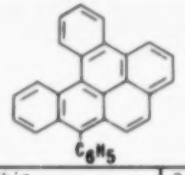
1. M.p. 313.5-314.5°. Substance may contain 3,4,8,9-dibenzpyrene. See Zilberman, 1937.
2. Latent period 4-8 mos.
3. Within 7 mos.
4. Within 8 mos.
5. Purity of compound doubtful.
6. Within 6 mos., first at 2 mos.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
936.--2,3,8,9-DI-(1',2'-NAPHTHO)-CHRYSENE (Continued) 								
Cook et al., 1932b	20 mice	Stock	---	0.5% in tetralin	Skin	0	10 alive at 6 mos., 1 alive at 1 year	572 days
	10 mice	--do--	---	0.5% in benzene	--do--	0	6 alive at 6 mos., 2 alive at 1 year	558 days
	20 mice	--do--	---	0.5% in oleic acid	--do--	0	12 alive at 1 year	807 days
937.--DINAPHTHOPERYLENE 								
Domagk, 1938	Mice	---	---	1% in oil; 50 paintings	Skin	0	---	10 mos.
938.--9,12,10,11-DIPHENYLENE-9,10-DIPHENYL-9,10-DIHYDRONAPHTHACENE 								
Velluz, 1938	Mice	---	---	In benzene	Skin painting	0	---	10 mos.
939.--9,12,10,11-DIPHENYLENENAPHTHACENE[1] 								
Velluz, 1938	Mice	---	---	In benzene	Skin painting	0	---	10 mos.

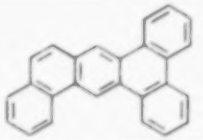
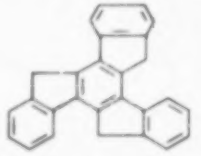
1. The blue hydrocarbon of Badoche, 1932.

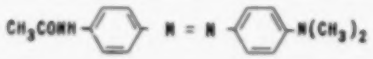
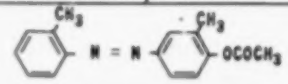
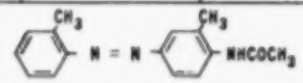
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
940.--7-METHYL-1,2,3,4-DIBENZPYRENE 								
Bachmann et al., 1937	2 mice	Het.	---	0.3% in benzene twice weekly	Skin painting	2 epi. 0 pap.	2 alive at 6 mos.	284 d.
941.--1',9-METHYLENE-1,2,5,6-DIBENZANTHRACENE 								
Shear[1]	Mice	---	---	Crystals	S.C.	0	---	116 d.
Shear, 1936b	17 mice	A	---	10 mg. crystals[2]	S.C.	9[3]	4 alive at 13 mos.	13 mos.
942.--2',3'-NAPHTHO-3,4-PYRENE 								
Cook and Hewett, 1933	20 mice	---	---	---	Skin painting	0	18 alive at 8 mos.	8 mos.
Barry et al., 1935	20 mice	Het.	---	0.3% in benzene twice weekly	—do—	0	15 alive at 1 yr.	713 d.
943.--PHENANTHRA-ACENAPHTHENE[4] 								
Barry et al., 1935	5 mice	Het.	---	0.3% in benzene twice weekly	Skin	2 epi. 0 pap.	2 alive at 1 yr.	577 d.
	5 mice	Het.	---	—do—	—do—	0 epi. 1 pap.	—do—	677 d.
	10 mice	Het.	---	—do—		2 epi. 2 pap.	6 alive at 1 yr.	539 d.

1. Unpublished results cited by Fieser and Hershberg, 1935.
2. Melting point 266°-267° corr.
3. First in 5 months; in half of the animals in 13 months.
4. Pure.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
944.--2',3'-PHENANTHRA-1,2-ANTHRACENE 								
Barry et al., 1935	10 mice	Het.	——	0.16% in benzene twice weekly	Skin painting	0	7 alive at 6 mos. 4 alive at 1 yr.	754 d.
945.--PHENANTHRAFLUORENE[1]  or 								
Cook, 1932b	10 mice	Het.	——	0.5% in benzene twice weekly	Skin	0	9 alive at 6 mos.	228 d.
	10 mice	Het.	——	--do--	--do--	0	2 alive at 6 mos.	214 d.
946.--2',3'-PHENANTHRA-2,3-PHENANTHRENE 								
Barry et al., 1935	5 mice	Het.	——	0.25% in benzene twice weekly	Skin	0	4 alive at 6 mos. 2 alive at 1 yr.	517 d.
	5 mice	Het.	——	0.17% in xylene twice weekly	--do--	0	5 alive at 6 mos. 3 alive at 1 yr.	787 d.
947.--5-PHENYL-1,2,3,4-DIBENZPYRENE  C_6H_5								
Barry et al., 1935	10 mice	Het.	——	0.3% in benzene twice weekly	Skin painting	0 epi. 1 pap.	10 alive at 6 mos. 3 alive at 1 yr.	635 d.

1. Melting point 302°-304°.

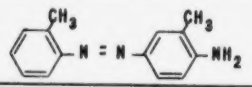
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
948.--1,2,3,4,5,6-TRIBENZANTHRACENE 								
Kennaway, 1930	10 to 20 mice	---	---	0.3% in benzene	Skin painting	0	---	---
Cook et al., 1932b	20 mice	Hal.	---	0.9% in xylene,[1] then 0.3% in 1% in benzene twice weekly	Skin	0	9 alive at 1 yr.	745 d.
949.--TRUXENE 								
Kennaway, 1924a	100 mice	---	---	in lanolin	---	0	---	9 mos.
	100 mice	---	---	in xylene	---	0	---	9 mos.
	100 mice	---	---	in "90% benzol"	---	0	---	9 mos.
Kennaway, 1924b	100 mice	---	---	in lanolin	---	0	---	9 mos.
	100 mice	---	---	in xylene	---	0	---	9 mos.
	100 mice	---	---	in "90% benzol"	---	0	---	9 mos.
Kennaway, 1924c	Mice	---	---	---	Skin painting	0	---	---
Kennaway and Hieger, 1930	--do--	---	---	---	--do--	0	---	---
Twort and Fulton, 1930	--do--	---	---	in liquid paraffin	--do--	0	---	50 wks.
	--do--	---	---	in oleic acid	--do--	0	---	50 wks.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
950.--4'-ACETAMINO-4-DIMETHYLAMINOAZOBENZENE 								
Nagao, 1941c	42 rats	White	---	0.75% to 2.5% in food	P.O.	0	---	Ca. 400 days
951.--4'-ACETOXY-2,3'-DIMETHYLAZOBENZENE 								
Nagao and Hashimoto, 1939	31 rats	White	---	0.1-0.3% in food	P.O.	0	6 alive at 188 days	380 days
952.--ACETYL-o-AMINOAZOTOLUENE 								
Yoshida, 1932c	Guinea pigs	---	---	Suspension in gum arabic solution	S.C.	0	---	---
Maruya, 1936	Rats	---	---	---	P.O.	0[1]	---	76 days
Maruya and Tanaka, 1936	Rats	---	---	---	P.O.	Tumors[2]	---	---
Maruya, 1938	10 rats	White	M & F	0.02% in food	P.O.	0[3]	---	219 days
Seligman and Shear, 1941	20 mice	C3H	--do--	10 mg. crystals	S.C.	0[4]	---	19 mos.
Korosteleva, 1940b	Rat	---	---	---	P.O.	Carc.[5]	---	---
953.--p-AMINOAZOBENZENE								
Stoeber, 1909	Rabbit	---	---	In olive oil	S.C., ear	0[6]	---	---
Benthin, 1911	--do--	---	---	In olive oil or rabbit fat	I.M., ear	0	---	At least 8 weeks
Yoshida, 1931[7]	Guinea pigs	---	---	0.05-0.1 g. in olive oil	S.C.	0	---	---
Yoshida, 1932a	Rats	White	---	0.1% in food	P.O.	0	---	Probably over 300 days
Yoshida, 1932c	Guinea pigs	---	---	10% in olive oil	S.C.	0	---	---
	Mice	---	---	--do--	--do--	0	---	23 days
Yoshida, 1934c	16 rats	White	---	In food	P.O.	0	---	449 days
Sasaki and Yoshida, 1935	16 rats	White	---	In food	P.O.	0	---	449 days
Kinosita, 1936a	Rats	White	---	In olive oil	P.O.	0	---	238 days
Maruya, 1937	Rats	White	---	In food	P.O.	0[8]	---	At least 200 days
Maruya, 1938	11 rats	--do--	M & F	0.06% in food	P.O.	0[9]	---	238 days

1. Cancerous changes in liver.
2. Liver tumors and bladder epitheliomas.
3. Change in kidneys described.
4. Mammary and liver tumors, probably spontaneous.
5. Of the liver and bladder.
6. Atypical proliferation observed.
7. Called o-Aminoazobenzene in original paper but the p- isomer is almost certainly intended.
8. Changes in liver and kidneys.
9. Changes in kidneys described.

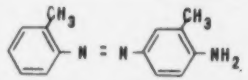
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
953.--p-AMINOAZOBENZENE (Continued)								
Kinosita, 1940a	Mice	---	---	---	P.O.	Pap.[1]	---	---
Smith, et al., 1943	22 rats	Wistar	M & F	0.1% in food[2]	P.O.	0	---	41 days
Kirby, 1944	16 rats	--do--	---	0.2 and 0.3% in food	P.O.	3 carc.[3]	8 died at 17 mos.	Over 18 mos.
Kirby, 1945b	39 mice	Stock	M & F	7.5 mg. then 5.0 mg. in arachis oil every 2 weeks[4] m.p. 123°	S.C.	0	4 alive at 1 year	626 days
Miller and Baumann, 1945	10 rats	Albino	---	0.0536 in food	P.O.	0	9 alive at 10 mos.	10 mos.
Miller, J.A., et al., 1945	4 rats	--do--	---	--do--	--do--	0	---	6 weeks
Miller, E.C. and Baumann, 1946	12 rats	Sprague-Dawley	M	0.106% in food for 14 weeks[4]	P.O.	0	All alive at 14 weeks	At least 22 weeks
Kirby and Peacock, 1947	16 rats	Wistar	M	0.3-1.0% in food	P.O.	Tumors[5]	---	At least 120 weeks
954.--4-AMINO-1,2'-AZONAPHTHALENE								
Cook, et al., 1940a	10 mice	---	---	0.6% in benzene twice weekly	Skin	0	---	458 days
	30 mice	---	---	5 mg. in sesame oil	S.C.	0	---	694 days
	50 mice	---	---	Ca. 5 mg. weekly	P.O.	0	---	569 days
955.--o-AMINOAZOTOLUENE								
Stoeber, 1909	Rabbit	---	---	In olive oil	S.C., ear	0[6]	---	---
Benthin, 1911	--do--	---	---	In olive oil or rabbit fat	I.M., ear	0	---	At least 8 weeks
Yoshida, 1931	30 guinea pigs	---	---	0.05-0.1 gm. in olive oil, every 1-3 weeks	S.C.	0	9 alive at 30 days	154 days
Yoshida, 1932a	26 rats	White	---	0.1% in food	P.O.	4[7]	20 died neg. in 186 days	344 days
Yoshida, 1932b	Rats	---	---	---	P.O.	Tumors[8]	---	---
Yoshida, 1932c	Guinea pigs	---	---	10% in olive oil	S.C.	0	---	---
	Mice	---	---	--do--	S.C.	0[9]	---	---
Yoshida, 1932d	24 guinea pigs	---	---	More than 0.018 gm. weekly	S.C.	0[10]	---	50 weeks
	Guinea pigs	---	---	In food	P.O.	0[11]	---	241 days
	Rats	---	---	--do--	--do--	0	---	Over 2 mos.
Yoshida, 1932e	30 guinea pigs	---	M & F	0.05% to 0.1% in olive oil, 1 to 2 cc. every 1-3 weeks	S.C.	0	14 died	5 mos.
	Mice	---	---	In olive oil	S.C.	---	---	---
	Rats	---	---	--do--	--do--	---	---	---

1. Gastric.
2. 2 different diets used.
3. Of the liver-cell of the 8 rats dead at 17 mos.; first in 13 mos. Metastases to mesentery.
4. Different diets.
5. 6 papillomas, 5 hepatomas, 2 liver-cell carcinomas with metastases.
6. Atypical proliferation observed.
7. Hepatomas in all animals that lived over 266 days.
8. Of the liver.
9. Adenomatous lesions of the liver; liver cirrhosis.
10. In 11 animals, epithelial metaplasia of the thyroid, very similar to epithelioma.
11. One case in 7 animals of epithelial metaplasia of the thyroid.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
955.--o-AMINOAZOTOLUENE (Continued) 								
Yoshida, 1933	26 rats	White	---	0.1% in food	P.O.	4[1]	---	344 days
	Rats	---	---	--	S.C.	0[2]	---	448 days
Yoshida, 1934a	30 rats	White	---	10% in olive oil, 0.2-0.5 cc. twice weekly	S.C.	1[3]	6 alive at 200 days	At least 448 days
Yoshida, 1934c	474 rats	--do--	---	0.05-0.15% in food	S.C.	83[4]	---	421 days
Isibasi, 1935	Rats	---	---	0.1% (?) in food	P.O.	Tumors[5]	---	At least 289 days
Nakazawa, 1935	Mice	---	---	---	P.O.	0[6]	---	---
Nishiyama, 1935b	46 mice	---	---	In food	P.O.	6[7]	7 alive at 11 mos.	At least 11 mos.
Sasaki, 1935	300 rats	---	---	0.1% in food	P.O.	70[8]	Many killed early	300 days
Sasaki and Yoshida, 1935	186 rats	White	---	0.1% in food	P.O.	25[9]	27 alive at 200 days	346 days
	60 rats	--do--	---	0.05 to 0.15% in food	P.O.	Many[10]	30 died neg. in 2 mos.	Over 405 days
Sasaki and Yoshida,[11]	300 rats	--do--	---	0.1% in food	--do--	68[12]	Many killed or died early	At least 357 days
Sumita, 1935	Rats	---	F	10 mg. in food daily	--do--	13[13]	13 alive at 270 days	336 days
Yoshida, 1935a	23 rabbits	---	M & F	0.1-0.225% in food	--do--	0[14]	---	25-639 days
Yoshida, 1935b	378 rats	---	---	In food	--do--	25 epi.[15] 24 pap.	Many killed early	493 days
Yoshida, 1935c	7 rats	---	---	In food[16]	--do--	2[1]	---	250 days
Aoji, 1936a	15 fowls	White Leghorn	M & F	10% in olive oil, 0.4 to 0.8 cc. every 1 or 2 days	S.C.	0[17]	4 alive at 150 days	265 days
Aoji, 1936b	30 fowls	--do--	M & F	100 mg. in food daily	P.O.	0	---	0.5-9 mos.
	15 fowls	--do--	--do--	10% soln. 0.4-0.8 cc. every 1-2 days	Inj.	3[18]	---	265 days

1. Hepatomas.
2. One hepatoma containing cysticercus fasciolaris.
3. Hepatomas, also 2 skin carcinomas and cysticercus sarcomas.
4. Liver carcinoma, first at 187 days; also cholangiomas. Metastases to lymph nodes, lungs, etc.
5. First carcinoma at 270 days and first hepatoma at 289 days. Also cholangiomas and peritoneal fibrosarcomas.
6. Annular cirrhosis of the liver observed.
7. Of the liver.
8. Hepatomas, chiefly after 200 days, also 4 cholangiomas.
9. Liver tumors. All obtained after 196 days.
10. Of the liver; also some cholangiomas.
11. Work reviewed by Miura, 1935.
12. Hepatomas; first tumor at 92 days.
13. Hepatomas, all between 270 and 336 days.
14. Liver cirrhosis.
15. Of the bladder; first epithelioma at 101 days.
16. Other animals also received subcutaneous glucose injections; one case of liver cirrhosis.
17. In 4 cases, metaplasia of the follicular epithelium of the thyroid.
18. Adenocarcinoma of the liver.

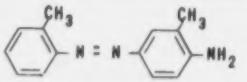
955.--o-AMINOAZOTOLUENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Heep, 1936	Rats	---	---	0.35% in food	P.O.	0[1]	2 alive at 8 weeks	12 weeks
Kinosita, 1936a	Rats	White	---	In olive oil	P.O.	Tumors[2]	---	---
Kinosita, 1936b	Rats	---	---	---	P.O.	--do--	---	At least 400 days
Nakazawa, 1936	32 dogs	---	---	In food	P.O.	0[3]	4 alive at 530 days	530 days
Takizawa, 1936	Rats	White	---	---	P.O.	Tumors[4]	---	---
Zylberszac, 1936	35 rats	---	---	0.2% in food for 6 mos.	P.O.	5[5]	Many killed early	237 days
Amano, 1937	Rats	---	F	---	P.O.	1[6]	3 alive at 270 days	270 days
Boyland and Brues, 1937	20 mice	Simpson albino and stock	---	0.3% in benzene twice weekly	Skin	0[7]	---	Over 1 year
Hayashi and Tomita, 1937	Rats	---	M & F	In food weekly[8]	P.O.	2[9]	4 alive at 262 days	279 days
Kimura and Imakyure, 1937	Rats	---	---	0.25% in food	P.O.	6[10]	Many killed early	210 days
Kinosita, 1937	--do--	---	---	---	S.C.	Tumors[2]	---	---
	--do--	---	---	In cholesterol	Liver	0	---	---
	--do--	---	---	--do--	Kidney	0	---	---
	Rabbits	---	---	--do--	Under periosteum	0	---	---
	--do--	---	---	--do--	Bone marrow	0	---	---
	Rabbits	---	---	--do--	Brain	0	---	---
	Pigeons	---	---	--do--	--do--	0	---	---
	Toads	---	---	--do--	I.M.	0	---	---
	Rabbits	---	---	In olive oil	I.V.	0	---	---
Maruya[11]	Rats	---	---	---	S.C.	Tumors[2]	---	---
	--do--	---	---	In food	P.O.	1[12]	---	At least 473 days
Pandolfine, 1937	7 rabbits	---	M & F	1-5% oily suspension every five days, 22-30 times	Skin	Tumors	---	At least 75 days
	6 rabbits	---	--do--	1.5% suspension	Skin	--do--	---	--do--

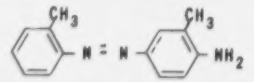
1. Liver cirrhoses and adenoma-like hyperplasia of the liver. Other experiments with arsenic-poisoned animals are reported.
2. Of the liver.
3. Stomach and duodenal ulcers and liver cirrhosis.
4. Hepatomas; also changes in other hematopoietic organs described.
5. Hepatomas; metastases to lungs.
6. Liver adenoma. Other animals fed also lecithin and cholesterol with different results.
7. Liver changes noted.
8. Other rats received also cholesterol and lecithin in the food.
9. Liver adenomas; one of the animals had also a hepatoma.
10. Liver cholangiomes, beginning at 101 days.
11. Unpub. results cited by Kinosita, 1937.
12. Papillomatous epi. of the bladder; also one lung epi.

955.--o-AMINOAZOTOLUENE (Continued)



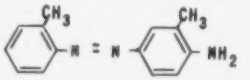
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Shear, 1937a	4 mice	M	F	10 mg. crystals, repeated injections	S.C.		7 alive at 9 mos.	14 mos.
	19 mice	A	M & F	--do--[1]	S.C.	13[2]		
Tomita, 1937	Rats	---	M & F	In food[3]	P.O.	2[4]	4 alive at 262 days	279 days
Waters, 1937	36 rats	Stock	M & F	0.1% in food	P.O.	15[5]	15 died or killed early	473 days
Wolbach, 1937	Mice	---	---	Suspension in glycerol	S.C.	0	---	---
	Rats	---	---	In food	P.O.	0	---	---
Yamasaki and Sato, 1937	9 rabbits	---	M	1% in olive oil, 5 cc. daily	Bladder	2 pap.[6]	3 died in 63 days	284 days
	6 rabbits	---	M	Saturated aqueous soln., 10 cc. daily	--do--	3 pap.[7]	2 died in 16 days	357 days
	14 rabbits	---	M	1% in olive oil, 1 cc. daily	S.C.	3 pap.[8]	5 died in 22 days	293 days
Yoshida, 1937	360 rats	White	---	--do--	P.O.	84[9]	---	Over 250 days
Zylberszac, 1937	Rats	---	---	In food	P.O.	Tumors[10]	---	---
Amano and Tomita, 1938	50 rats	---	M & F	In food	P.O.	0	5 alive at 270 days	270 days
	--do--	---	--do--	--do--[11]	P.O.	4[12]	6 alive at 270 days	--do--
	--do--	---	--do--	--do--[13]	P.O.	8[14]	10 alive at 270 days	--do--
Ando, 1938	Rats	---	M & F	In food	P.O.	Tumors[15]	---	Over 280 days
Heiman, 1938	5 rats	---	M & F	In food	P.O.	0	---	Over 1 year
Maruya, 1938	25 rats	White	--do--	0.1% in food	P.O.	Tumors[16]	---	473 days
Morosenskaya, 1938	108 mice	--do--	---	0.5% in olive oil for 4 mos.; total dose 0.5 g.	P.O.	14[5]	30 alive at 7 mos.	At least 8 mos.
	81 mice	--do--	---	1% in benzene every 2 days for 6 mos.; total dose 0.1 g.	Skin	22[5]	40 alive at 7 mos.	--do--
	54 mice	--do--	---	1% in sunflower seed oil, 0.25 cc. 4 times every 10 days; total dose 0.01 g.	S.C.	2[5]	17 alive at 7 mos.	--do--
Nakamura et al., 1938	Rats	White	---	3-10 mg. every 7-10 days	I.V., tail	0	---	260 days
	Rabbits	---	---	30-100 mg. every 7-10 days	I.V., ear	0	---	--do--
Rika[17]	Fowls	---	F	---	Oviduct	0	---	---
Tomita, 1938	Rats	---	M & F	In food[18]	P.O.	0[19]	---	At least 269 days

1. M.P. 99-101°.
2. Liver carcinoma, first tumor appearing at 11 mos.
3. Other animals also received added cholesterol and lecithin.
4. Liver adenoma; also one hepatoma.
5. Of the liver.
6. First appeared at 109 days; one probably malignant.
7. First appeared at 40 days.
8. Of the bladder; first at 54 days.
9. Hepatomas; first at 196 days; metastases to lungs and lymph nodes.
10. Of the liver.
11. Cholesterol added.
12. 2 hepatomas and 2 liver adenomas.
13. Weekly injections of "androstin".
14. 7 hepatomas and one liver adenoma.
15. Liver carcinomas in all animals living over 80 days.
16. Hepatomas; also bladder papillomas, one kidney papilloma and lung changes.
17. Unpublished results cited by Kinosita, 1938a.
18. Other animals receiving also injections of male hormones developed liver tumors (in males only).
19. Nodular hyperplasia of the liver in all animals alive at 269 days.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
955.--o-AMINOAZOTOLUENE (Continued) 								
Yamashita, 1938	120 rats	---	M & F	In food[1]	P.O.	Tumors[2]	---	280 days
Andervont, 1939d	14 mice	A	M	10 mg. crystals, 11 injections	S.C.	11[3]	---	12 mos.
	20 mice	I	---	--do--	S.C.	2[3]	18 alive at 12 mos.	12 mos.
	10 mice	C3H	---	--do--	S.C.	0	9 alive at 12 mos.	12 mos.
	15 mice	Y	---	--do--	--do--	1[3]	8 alive at 11 mos.	12 mos.
	14 mice	C	---	--do--	--do--	12[3]	---	--do--
	10 mice	A	---	--do--	--do--	7[3]	---	--do--
Andervont, 1939e	20 mice	I	M & F	10 mg. crystals monthly	S.C.	16[4]	All alive at 18 weeks	--do--
	10 mice	C3H	M	--do--	--do--	9[4]	--do--	--do--
	15 mice	Y	M & F	--do--	--do--	5[4]	--do--	--do--
	14 mice	C	M & F	--do--	--do--	14[4]	--do--	--do--
	10 mice	A	M	--do--	--do--	7[4]	--do--	--do--
Ando, 1939	Rats	---	---	In different diets	P.O.	Tumors[5]	---	400-500 days
Baumann et al., 1939	125 mice	C	---	0.05% in food[6]	P.O.	Tumors[5]	55 alive at 200 days; 12 alive at 300 days	400 days
Furukawa, 1939a	50 rats	---	M & F	In olive oil[7]	P.O.	22[8]	---	382 days
	--do--	---	--do--	--do--[9]	P.O.	14[8]	---	--do--
	15 rats	---	--do--	--do--[10]	P.O.	9[11]	---	305 days
Furukawa, 1939b	30 rats	---	---	5% in olive oil, 0.1-1.0 cc. weekly	S.C.	11[12]	---	14 mos.
Furukawa, 1939c	10 rats	---	M & F castr.	---	P.O.	6[13]	---	276 days
Furukawa, 1939d	Rats	---	---	In food	P.O.	12[14]	High early mortality. 23 alive at 271 days	Over 271 days
Furukawa, 1939e	50 rats	---	M & F	In food[7]	P.O.	22[15]	24 alive at 190 days	382 days
	--do--	---	--do--	--do--[9]	P.O.	14[16]	17 alive at 256 days	382 days
	--do--	---	--do--	--do--[10]	P.O.	9[17]	9 alive at 256 days	305 days

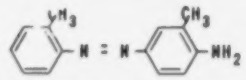
1. Other animals injected also with casein, India ink, and thyroid extract.
2. Of the liver.
3. Of the lung. Other lesions encountered reported in Andervont, 1939e.
4. Further results reported in Andervont, 1939d.
5. Of the liver.
6. Different diets used.
7. Barley diet.
8. 4 malignant hepatomas; also adenomas, cholangiomas and cirrhosis observed.
9. Noodles diet.
10. Rice diet.
11. 5 malignant hepatomas observed; also an adenoma.
12. Malignant hepatomas beginning at 280 days; also 11 adenomas observed, metastases to lungs, lymph nodes and skin.
13. Malignant hepatomas beginning at 242 days.
14. Hepatomas all in animals living over 271 days; also beginning at about 5 mos.
15. Hepatomas, first at 190 days; also liver adenomas (first at 121 days), cholangiomas and cirrhosis.
16. Hepatomas first in 256 days; also liver adenomas (first at 203 days), cholangiomas and cirrhosis.
17. Hepatomas, first at 256 days; also one liver adenoma at 104 days.

955.--o-AMINOAZOTOLUENE (Continued)



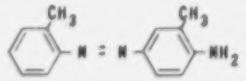
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Furukawa, 1939f	30 rats	---	M & F	5% in olive oil, 0.1 to 1 cc. weekly	S.C.	12[1]	21 alive at 230 days	410 days
Furukawa, 1939g	10 rats	---	M & F, castr.	In food	P.O.	6[2]	6 alive at 232 days	276 days
Goerner and Goerner, 1939b	130 rats	White	---	0.1% in food	P.O.	28[3]	28 alive at 55 weeks	61 weeks
Ishiwara and Saga, 1939	Rats	--do--	---	In food	P.O.	7[4]	21 alive at 200 days	At least 200 days
Ito, 1939	27 rats	---	F	0.05 to 0.1% in food	P.O.	Tumors[5]	15 alive at 265 days	365 days
	21 rats	---	F, castr.	--do--	P.O.	Tumors[6]	12 alive at 365 days	--do--
Morosenskaya, 1939	108 mice	P.-B	M & F	Up to 0.5 gm. (total dose)	P.O.	Tumors[7]	23 alive at 1 year	2 years
	54 mice	--do--	--do--	1% in sunflower seed oil, 0.25 cc., 4 injections	S.C.	Tumors[8]	19 alive at 1 year	Over 1 year
	81 mice	--do--	--do--	0.5% in benzene	Skin	--do--	25 alive at 1 year	2 years
Amano and Ando, 1940	22 rats	---	---	---	P.O.	Tumors[9]	Killed at intervals of 2 or 4 weeks	40 weeks
Andervont and Shimkin, 1940	20 mice	A	M	10 mg. monthly	S.C.	16[10]	---	10 mos.
	21 mice	A	M & F	0.5 mg. in aqueous suspension, single injection	I.V.	0	---	20 weeks
Ando, 1940	Rats	---	---	In food[11]	P.O.	8[12]	---	280 days
Araki and Shirota, 1940	Rats	---	---	In food[13]	P.O.	Hepatomas[14]	---	At least 250 days
Baumann, 1940	150 mice	A	M	0.05-0.1% in food[11]	P.O.	Tumors[15]	54 alive at 11 mos.	At least 11 mos.
Emmart, 1940	219 rats	Wistar	---	Ca. 0.019 g. daily in food	P.O.			
	42 rats	--do--	---	--do--	--do--			

1. Hepatomas, first at 230 days; also liver adenomas, first at 133 days; cholangiomas and cirrhosis, metastases to lungs, lymph nodes, and skin.
2. Hepatomas, first at 232 days; also liver adenomas, first at 110 days.
3. Hepatomas beginning in 55 weeks.
4. Other animals receiving added vitamin A and A plus B developed no tumors.
5. In 7 animals killed there were 3 liver adenomas and 2 hepatomas.
6. In 7 animals, 7 liver tumors and 6 hepatomas.
7. Of the liver; also lung tumors and one lymphosarcoma of the thymus. No stomach tumors.
8. Of the liver and lungs.
9. Adenomas and hepatomas.
10. Of the lung.
11. Different diets used.
12. Hepatomas; also one cholangioma among 24 killed at 280 days.
13. Other animals, fed also copper sulfate, had a lower mortality rate and developed tumors at a slightly earlier date.
14. Metastases in the surrounding lymph nodes and occasionally in more distant sites.
15. Of the liver in all alive at 7 mos. Nodules first observed at 7 mos.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
				955.--o-AMINOAZOTOLUENE (Continued) 				
Emmart, 1940 (Continued)	173 rats	Wistar, Osborne-Mendel and Buffalo	---	Ca. 0.019 g. daily in food	P.O.	114[1]	---	614 days
	47 rats	Osborne-Mendel	---	--do--	--do--			
Ishiaara and Saga, 1940	Rats	---	---	In food	P.O.	7	21 alive at 200 days	---
	Rats	---	---	--do--[2]	--do--	0	14 alive at 200 days	
Ito, 1940a	24 rats	White	F, castr.	0.05% then 0.1% in food[3]	P.O.	3[4]	11 rats alive at 1 year	1 year
	21 rats	White	--do--	0.5% then 0.1% in food	P.O.	4[5]	12 rats alive at 1 year	--do--
	56 rats	--do--	F	--do--[3]	--do--	13[6]	13 alive at 1 year	1 year
	27 rats	--do--	F	--do--	--do--	5[7]	15 alive at 1 year	--do--
Ito, 1940b	20 rats	---	---	0.05-0.10% in food for 250 days	P.O.	5 hepatomas	11 alive at 250 days	540 days
Ito, 1940c	Rats	---	---	0.05% in food for 250 days	P.O.	1[8]	11 alive at 250 days	At least 321 days
Korosteleva and Shabad, 1940	Guinea pigs	---	---	1% soln. in olive oil 0.1 cc. of 1% soln. 30 days later	S.C.	0	---	Ca. 30 days
	20 Guinea pigs	---	---	0.5% in olive oil, 0.2 cc.	S.C.	0	---	--do--
Korosteleva, 1940a	Mice	---	---	1% soln. in benzene	Skin	Tumors[9]	---	At least 6 mos.
Korosteleva, 1940b	Rats	---	---	---	P.O.	Tumors[10]	---	---
Maisin, 1940	100 rats	---	---	0.01 g. daily in food[11]	P.O.	Tumors	---	700 days
Sasaki et al., 1940	30 rats	---	M & F	1% in olive oil 0.5 or 1 cc. weekly, 12 times[12]	S.C.	4 sarc.	11 alive at 326 days	588 days
	20 rats	---	--do--	0.1% in food for 100 or 180 days[13]	P.O.	2 sarc.	8 alive at 400 days	648 days

1. Of the liver (both hepatomas and carcinomas). No tumors in 200 days and only one liver tumor at 200-300 days in 140 rats autopsied (first at 211 days); metastases to lung.
2. Added vitamin A in diet.
3. Also injected with 2-5 r.u. of prolan every 3 days.
4. 2 adenomas and one carcinoma of liver in 7 animals at 365 days.
5. 2 adenomas and two carcinomas of liver in 7 animals at 365 days.
6. 7 adenomas and 6 carcinomas of liver in 7 animals at 365 days.
7. 3 adenomas and 2 carcinomas of liver in 7 animals at 365 days.
8. Out of one animal autopsied; also leukemia.
9. Of the liver.
10. Carcinoma of the liver and bladder; papilloma of the bladder.
11. Special diet.
12. Containing also kieselguhr in suspension.
13. Also injected S.C. with suspension of kieselguhr in olive oil.

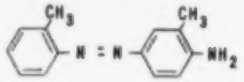
955.--o-AMINOAZOTOLUENE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Tomita, 1940	40 rats	---	M, normal and castr.	In food for 60 days[1]	P.O.	Tumors[2]	---	240 days
Vassiliadis, 1940	100 rats	---	---	0.01 g. daily in food[3]	P.O.	0	---	2 years
	--do--	---	---	0.01 g. daily in food[4]	P.O.	0	---	--do--
	--do--	---	---	0.01 g. daily in food[5,3]	P.O.	0	High mortality	Over 1 year
	--do--	---	---	--do--[5,3]	P.O.	0	--do--	--do--
	--do--	---	---	--do--[6]	P.O.	30[7]	42 alive at 270 days	270 days
	--do--	---	---	--do--[8]	P.O.	0	---	20 mos.
Amano, and Hashida, 1941	Rats	---	---	In food	P.O.	6[9]	---	365 days
Andervont and Edwards, 1941	167 mice	A,C3H,C and their hybrids	M & F	10 mg. crystals monthly	S.C.	0[10]	---	11 mos.
Ando, 1941a	9 rats[11]	---	---	0.10 or 0.135% in food[12]	P.O.	6[13]	---	550 days
Ando, 1941b	14 rats	---	---	0.10 or 0.135% in food[12]	--do--	7[14]	14 alive at 411 days	756 days
Ando, 1941c	Rats	---	---	0.135% in food[15]	--do--	6[16]	---	389 days
Ando, 1941d	50 rats	---	M & F	In food	P.O.	6[17]	8 alive at 207 days	280 days
Craig et al., 1941	Mice	C	---	10 mg. crystals monthly	S.C.	Hepatomas	---	---
Hamperl, 1941	Rats	---	---	In food	P.O.	Tumors[18]	---	At least 1½ years
	Rabbits	---	---	In food	P.O.	0	---	---
Hashida, 1941	60 rats	---	---	In food[19]	P.O.	Hepatomas	---	410 days
Ito, 1941a	29 rats	---	---	0.1% in food[20]	P.O.	24[21]	---	365 days
Ito, 1941b	20 rats	---	---	0.05-0.10% in food	P.O.	5 carc.[22]	5 alive at 360 days	365 days

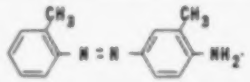
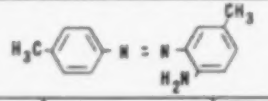
1. 20 other animals irradiated with light with little significant changes in results.
2. 2 hepatomas and 2 adenomas.
3. Bayer's preparation; ordinary diet of wheat flour.
4. Merck's preparation; ordinary diet of wheat flour.
5. Also received weekly i.P. injections of thorotrast.
6. Rice diet.
7. Liver adenocarcinoma.
8. Diet of rice and wheat flour.
9. Hepatomas; one out of 3 rats killed in 210-366 days and 5 out of 5 killed at 365 days. Anti-carcinogenic action of certain dyes reported.
10. But hepatic changes showing a sex difference.
11. Alive at 280 days.
12. Different diets used.
13. Hepatomas.
14. Liver carcinomas; also 3 mammomas. All in those treated over 411 days.
15. Other rats fed also fish liver oil had lower incidence of tumors.
16. Liver carcinoma.
17. One adenoma and 5 hepatomas.
18. Of the liver (cancer) after 1½ years.
19. Effect of different dyes on incidence of tumors.
20. Other animals fed also methylene blue had lower incidence of tumors.
21. Liver carcinomas.
22. Of the liver; also 4 with liver adenomas.

955.--o-AMINOAZOTOLUENE (Continued)

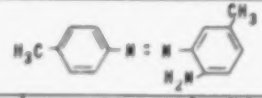
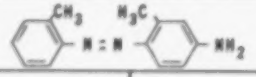
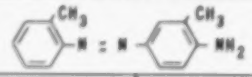
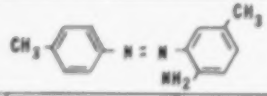
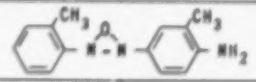


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Ito, 1941b (Continued)	11 rats	---	---	0.125-0.25% in food	P.O.	8 carc.[1]	---	365 days
	15 rats	---	---	0.125-0.25% in food for 290 days	P.O.	8 carc.[2]	---	--do--
	11 rats	---	---	--do--	P.O.	6 carc.[3]	---	--do--
Lee, 1941c	50 mice	C57 bl	M & F	5 mg. (total dose) in olive oil plus 5 mg. pellets	S.C.	13 sarc.[4]	30 alive at 45 days	Over 45 days
	--do--	DBA	--do--	--do--	--do--	7[5]	---	---
Mori, 1941a	70 rats	Albino	M & F	0.02-0.06% in food[6]	P.O.	45[7]	---	150 days
Mori, 1941b	200 rats	Albino	M & F	0.02-0.10% in food[6]	P.O.	13[8]	---	350 days
Mori, 1941d	24 rats	White	---	In food	P.O.	8[7]	---	--do--
	38 rats	--do--	---	In food[9]	P.O.	2[7]	---	--do--
Nagao, 1941a	50 rats	--do--	---	1% in olive oil, 0.5 or 1 cc. weekly[10]	S.C.	4 sarc.[11]	---	588 days
	20 rats	--do--	---	0.1% in food[12]	P.O.	2 sarc.[14]	---	648 days
Nagao, 1941d	50 rats	---	M & F	1% in olive oil, 0.5 cc. or 1.0 cc. weekly[13]	S.C.	4 sarc.	---	455 days
	20 rats	---	--do--	--do--[15]	S.C.	0	---	--do--
Takai, 1941	Rats	White	---	In food	P.O.	Tumors[16]	Sacrificed periodically	8 mos.
Yoshida et al., 1941b	28 rats	---	---	In food[17]	P.O.	15 hepatomas	---	---
Andervont et al., 1942	11 mice	A	F	10 mg. in glycerol, 10 times[18]	S.C.	11[19]	---	52 weeks
	11 mice	A	M	10 mg. in glycerol, 10 times	S.C.	5	---	52 weeks
	25 mice	C3H	M	--do--	--do--	5	---	--do--
	12 mice	C	F	--do--	--do--	12	---	--do--
	12 mice	C	M	--do--	--do--	1	---	--do--
	13 mice	C57 bl	F	--do--	--do--	13	---	--do--
	34 mice	--do--	M	--do--	--do--	3	---	--do--
	254 mice	Hybrids	M & F	--do--	--do--	161	---	--do--
Turner and Bullisken, 1942	60 mice	C	M & F	2.5 mg. in corn oil weekly	S.C.	8 sarc.[20]	30 died at 11 mos.	Ca. 11 mos.
Andervont, 1943a	40 mice	C	M & F	5 mg. in olive oil monthly, 9 times[21]	S.C.	10 hepatomas[22]	11 alive at 28 weeks	52 weeks
	41 mice	C57 bl.	--do--	--do--	--do--	5 hep.[23]	--do--	--do--

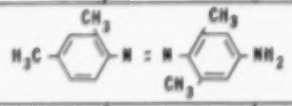
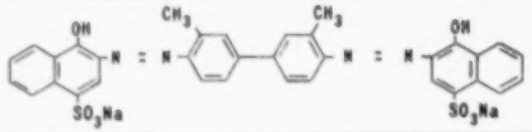
1. Of the liver out of 8 killed at 365 days; all also had liver adenomas.
2. Of the liver out of 9 killed at 365 days; all had liver adenomas.
3. Of the liver out of 7 killed at 365 days; 6 had liver adenomas.
4. First at 45 days. Also one hepatoma.
5. Liver tumors (hepatomas).
6. Different diets used.
7. Liver cancers.
8. Hepatomas; first at 241 days.
9. Liver added to diet.
10. Containing also kieselguhr in suspension.
11. Injected with kieselguhr suspension only (4 rats) gave no tumors.
12. Also injected S.C. with suspension of kieselguhr in olive oil.
13. Containing suspension of diatomaceous earth. Suspension of diatom. earth alone gave 2 sarcomas out of 20.
14. Also 5 hepatomas.
15. Containing suspension of ivory powder.
16. Hepatomas and adenomas.
17. Injected with colchicine after 5-10 mos. of feeding.
18. Compound used without purification except in C57 mice.
19. Hepatomas; also hemangio-endotheliomas in each strain and lung tumors in all but C3H and C57 bl.
20. Out of 10 mice autopsied; first at 11 mos. Also one with liver carcinoma and 2 with liver adenoma.
21. M.P. 102.5-103° Corr.
22. In female; also pulmonary tumors, hemangio-endotheliomas and one sarcoma at site.
23. In females; also hemangio-endotheliomas, 3 sarcomas at site.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
955.--o-AMINOAZOTOLUENE (Continued) 								
Andervont, 1945a (Continued)	17 mice	C3H	M & F	5 mg. in olive oil monthly, 9 times[1]	S.C.	4[2]	11 alive at 28 weeks	52 weeks
	8 mice	A	F	--do--	--do--	2 hep.	--do--	--do--
Andervont and Edwards, 1945b	120 mice	A	F	10 mg. in glycerol monthly for 1-5 mos.	S.C.	54 hep.[3]	All alive at 26 weeks	1 year
Andervont et al., 1946	24 mice	C	M & F	0.06% in food	P.O.	18 hep.[3]	---	183 days
	36 mice[4]	C	--do--	0.03% in food	P.O.	14 hep.[3]	---	223 days
Eltsina, 1945	Mice	---	---	1% in benzene	Skin	Tumors[5]	---	9 mos.
Kirby, 1945b	14 mice[6]	Mixed	M	5 mg. in arachis oil, every 2 weeks[7]	S.C.	0[8]	---	---
	18 mice[6]	--do--	F	--do--	S.C.	0[9]	---	---
	10 mice[6]	CBa	M	--do--	--do--	0[10]	---	---
	22 mice[6]	--do--	F	--do--	--do--	0[11]	---	---
	15 mice[6]	C57, Bl.	M	--do--	--do--	0[12]	---	---
	18 mice[6]	--do--	F	--do--	--do--	1 sarc.[13]	---	---
Vylegjanin, 1945	226 mice	---	---	0.5% soln. in butter in food every 3-5 days	P.O.	Tumors[14]	---	Ca. 2 years
Andervont, 1947	Ca. 115 mice	A	F	1-8 mg. in 0.25 cc. olive oil	S.C. & P.O.	Tumors[15]	---	15 mos.
Andervont and Dunn, 1947a	Mice	C	F	---	---	---	---	---
Andervont and Dunn, 1947b	94 mice	C	M & F, normal & castr.	10 mg. moistened with glycerol, monthly for 7 mos.	S.C.	Hepatomas	---	10 mos.
Hartwell and Andervont, 1947 Unpub. results	11 mice	C	F	4 mg. in dil. HCl soln., 9 injections	S.C.	1 hep.[16]	---	12 mos.
956.--p-AMINOAZOTOLUENE 								
Yoshida, 1934c	20 rats	White	---	In food	P.O.	0	---	476 days
Miura, 1935	Rats	White	---	--do--	--do--	0	---	Prolonged period

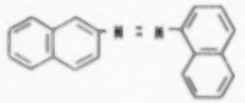
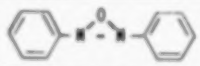
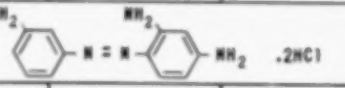
1. M.P. 102.5-103° Corr.
2. In males; also one carcinoma at site.
3. Also pulmonary tumors and hemangio-endotheliomas.
4. Alive in 223 days.
5. Adenomas in animals examined at 9 mos.
6. Number examined post mortem.
7. Different diets used.
8. 2 liver tumors; first at 233 days, one with metastases.
9. 7 liver tumors; first at 366 days, 3 with metastases.
10. 5 liver tumors; first at 259 days.
11. 4 liver tumors; first at 326 days.
12. 6 liver tumors; first at 385 days; one with metastases.
13. In 252 days, 3 liver tumors; first at 278 days.
14. Liver adenomas.
15. Pulmonary tumors and hepatomas.
16. Liver reaction in 6 mice.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
956.--p-AMINOAZOTOLUENE (Continued) 								
Sasaki and Yoshida, 1935	20 rats	white	---	in food	P.C.	0	---	476 days
Kirby, 1945	Mice	Stock	M & F	2.5-10 mg. in olive oil, every 2 weeks[1]	S.C.	0	---	472 days
957.--4'-AMINO-4-DIMETHYLAMINOAZOBENZENE								
Nagao, 1941c	40 rats	white	---	0.75% to 2.15% in food	P.O.	0	---	Ca. 500 days
958.--4'-AMINO-2,2'-DIMETHYLAZOBENZENE 								
Korosteleva, 1940b	Rats	---	---	---	P.O.	0	---	---
Kinosita, 1940[2]	Rats	---	---	---	P.O.	0	---	---
Hartwell and Andervont, 1947, unpub. results	20 mice	C	M & F	200 mg. in glycerol susp., 8 times	S.C.	0	---	10 mos.
959.--4-AMINO-2',3-DIMETHYLAZOBENZENE 								
Korosteleva, 1940b	Rats	---	---	---	P.O.	Carc. & pap.[3]	---	---
960.--6-AMINO-3,4'-DIMETHYLAZOBENZENE 								
Korosteleva, 1940b	Rats	---	---	---	P.O.	0	---	---
961.--4'-AMINO-2,3'-DIMETHYLAZOXYBENZENE 								
Otsuka, 1938	10 rats	white	---	0.1% in food	P.O.	0	---	307 days
	--do--	--do--	---	0.1 to 0.4% in food	P.O.	0[4]	6 alive at 171 days	255 days
Nagao, 1939	38 rats	white	---	0.1 to 0.4% in food	P.O.	0[5]	12 alive at 200 days	265 to 307 days
Nagao, 1940a	Rabbits	---	---	---	P.O.	0[6]	---	---
	38 rats	---	---	0.1 to 0.4% in food	--do--	0[7]	---	307 days

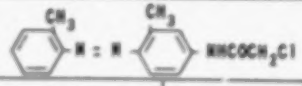
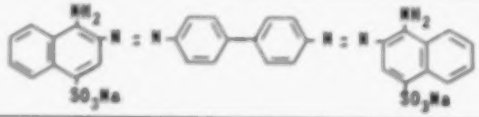
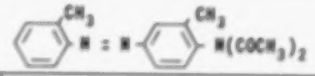
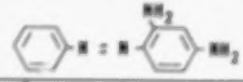
1. Different diets used.
2. Citing work of Yoshida.
3. Of the liver and bladder.
4. Proliferation of bile-duct epithelium, in one case tending to be infiltrated.
5. In some cases low-grade hypertrophy of the bile-duct epithelium and of liver cells.
6. Liver cirrhosis.
7. Hypertrophy of liver cells and proliferation of bile-duct epithelium.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
962.--4'-AMINO-2,4,2',6'-TETRAMETHYLAZOBENZENE 								
Kinosita, 1940a[1]	Rats	---	---	---	P.O.	0	---	---
963.--AZOBENZENE								
Kinosita, 1936a	Rats	White	---	In olive oil	P.O.	0	---	At least 400 days
Kinosita, 1937	Rats	---	---	In cholesterol	Liver	0	---	---
	--do--	---	---	--do--	Kidney	0	---	---
	Rabbits	---	---	--do--	Under periosteum	0	---	---
	--do--	---	---	--do--	Bone marrow	0	---	---
	--do--	---	---	--do--	Brain	0	---	---
	Pigeons	---	---	--do--	--do--	0	---	---
	Toads	---	---	--do--	I.M.	0	---	---
Tsunemoto[2]	Rabbits	---	---	In olive oil emulsion	I.V.	0	---	---
Maruya, 1937	Rats	White	---	In food	P.O.	0[3]	---	At least 200 days
Maruya, 1938	10 rats	White	M & F	0.06% in food	P.O.	0[4]	---	192 days
Shear and Stewart, 1941	20 mice	A	M	10 mg. crystals, repeated inj.	S.C.	0	---	18 mos.
Smith et al., 1945	Over 32 rats	Wistar	M & F	0.06% in food up to 63 days	P.O.	0	High mortality	77 days
964.--AZO BLUE 								
Meyl, 1892	1 dog	---	---	1.5 g. daily	P.O.[5]	0	---	1 mo.
965.--1,1'-AZONAPHTHALENE								
Cook et al., 1940a	20 mice	---	---	0.3% in benzene twice weekly[6]	Skin	0	---	549 days
	30 mice	---	---	5 mg. in sesame oil	S.C.	1 sarc.[7]	---	566 days
	50 mice	---	---	Ca. 5 mg. weekly	P.O.	1 carc.[8]	---	587 days

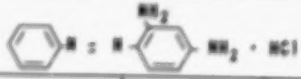
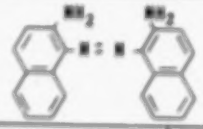
1. Citing work of Yoshida.
2. Unpublished results cited by Kinosita, 1937.
3. Changes in liver and kidney.
4. Changes in kidney.
5. By stomach tube.
6. M.P. 188-190°.
7. At 441 days. Numerous metastases in peritoneal cavity; also one hepatomatous growth and one possible cholangiomatous growth.
8. Of the stomach; also 2 cholangiomatous growths (and 2 others possible) in liver.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
966.--1,2'-AZONAPHTHALENE 								
Cook et al., 1940a	20 mice 25 mice 48 mice	--- --- ---	--- --- ---	0.6% in benzene twice weekly 5 mg. in sesame oil Ca. 5 mg. weekly	Skin S.C. P.O.	0 1 sarc. 0[1]	--- --- ---	575 days 574 days 569 days
967.--2,2'-AZONAPHTHALENE								
Cook, 1940	Mice	---	---	---	Skin, S.C. and P.O.	Tumors[2]	---	---
Cook et al., 1940a	10 mice 30 mice 50 mice	--- --- ---	--- --- ---	0.6% in benzene twice weekly[3] 5 mg. in sesame oil Ca. 5 mg. weekly	Skin S.C. P.O.	0[4] 0[5] 0[6]	--- --- ---	828 days 540 days 493 days
968.--AZOXYBENZENE 								
Shear and Stewart, 1941	10 mice	A	M	10 mg. crystals, repeated inj.	S.C.	0	---	18 mos.
969.--o-AZOXYTOLUENE								
Shear and Stewart, 1941	14 mice	A	M & F	Ca. 5 mg. crystals, repeated inj.	S.C.	0	---	19 mos.
970.--BENZAL-p-AMINOAZOBENZENE								
Seligman and Shear, 1941	20 mice	A	M & F	10 mg. crystals	S.C.	0	---	18 mos.
971.--BISMARCK BROWN 								
Meyl, 1892	1 dog	---	---	0.25 g. daily in food	P.O.	0	---	1 mo.
972.--p-(BIS-PHENYLAZO)-BENZENE								
Seligman and Shear, 1941	20 mice	A	M & F	10 mg. crystals	S.C.	0	---	16 mos.

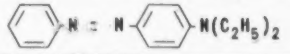
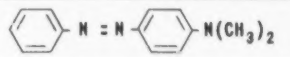
1. One hepatomatous growth in liver.
2. Liver-cell carcinoma but mostly of a cholangiomatous type.
3. M.P. 205-6°.
4. 5 cholangiomatous growths and one possible hepatomatous growth.
5. One with possible giant-cell sarcoma at 385 days. Also 11 cholangiomatous growths (and 3 more possible) and 2 possible hepatomatous growths.
6. 26 cholangiomatous growths (and one more possible) and 4 hepatomatous growths (and 4 more possible).

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
973.--CHLORACETYL-o-AMINOAZOTOLUENE 								
Seligman and Shear, 1941	20 mice	C3H	M & F	10 mg. crystals	S.C.	0[1]	---	11 mos.
974.--4'-CHLORO-2,3'-DIMETHYLAZOBENZENE								
Seligman and Shear, 1941	20 mice	A	F	0.05 cc. of melted substance	S.C.	0	---	17 mos.
975.--CONGO RED 								
Meyl, 1892	1 dog --do--	--- ---	--- ---	1 g. daily 0.25 g. in water 5 times in 10 days	P.O.[2] S.C.	0 0	--- ---	1 mo. 1 mo.
976.--DIACETYL-o-AMINOAZOTOLUENE 								
Yoshida, 1932c	Guinea pigs	---	---	10% in olive oil	S.C.	0	---	---
Harada, M., 1936b	39 rats	White	---	0.1% in food	P.O.	Tumors[3]	5 alive at 322 days	At least 412 days
Kinosita, 1936a	Rats	White	---	In olive oil	P.O.	Hepatomas	---	Over 300 days
Kinosita, 1936b	Rats!?!	---	---	---	P.O.	1[4]	---	---
Korosteleva, 1940b	Rats	---	---	---	P.O.	Carc.[5]	---	---
977.--2,4-DIAMINOAZOBENZENE 								
Kinosita, 1936a	Rats	White	---	In olive oil	P.O.	0	---	At least 400 days
Boyland and Brues, 1937	20 mice	Stock and Simpson albino		0.5% in benzene twice weekly	Skin	0	---	Over 1 year
Maruyo, 1938	10 rats	White	---	0.1% in food	P.O.	0[6]	---	215 days
Kinosita, 1940a	Rats	---	---	---	P.O.	0	---	---

1. Mammary and liver tumors, probably spontaneous.
2. By stomach tube.
3. 2 with liver adenocarcinomas and 4 with bladder papillomas.
4. Hepatoma, also proliferation of the bile-duct epithelium.
5. Of the liver and bladder.
6. Changes in kidney.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
978.--2,4-DIAMINOAZOBENZENE-4-HYDROCHLORIDE 								
Heyl, 1932	1 dog	---	---	0.065 g. daily	P.O.	0	---	1 mo.
	1 dog	---	---	0.1 g. in water 5 times in 10 days	Abdominal cavity	0	---	31 days
Kinosita, 1936a	Rats	White	---	In olive oil	P.O.	0	---	At least 400 days
Maruya, 1936	10 rats	White	M & F	0.1% in food	P.O.	0[1]	---	366 days
Seligman and Shear, 1941	20 mice	C57,bl	F	5 mg. crystals, repeated inj.	S.C.	0	---	18 mos.
979.--2,2'-DIAMINO-1,1'-DINAPHTHYL 								
Cook et al., 1946a	20 mice	---	---	0.5% in benzene twice weekly[2]	Skin	0[3]	---	442 days
	16 mice	---	---	5 mg. in sesame oil	S.C.	0[5]	---	198 days
	55 mice	---	---	Ca. 5 mg. weekly	P.O.	0[4]	---	355 days
980.--p-DI-n-AMYLAMINOAZOBENZENE								
Sugiura et al., 1945	10 rats	Sherman	---	4.8 mg. in food daily	P.O.	0	---	468 days
981.--DIAZOAMINOBENZENE								
Otsuka, 1950	50 mice	---	M & F	0.04% in food	P.O.	22 pap.[6]	---	---
Sasaki, 1935	Rats	---	---	---	P.O.	Pap.[7]	---	---
	Mice	---	---	---	--do--	--do--	---	---
Shear and Stewart, 1941	14 mice	A	---	Crystals, repeated inj.	S.C.	0	8 died in 1 mo.	17 mos.
	10 mice	A	M	--do--	S.C.	0	8 died in 6 weeks	---
	12 mice	A	M	5 mg. crystals	S.C.	0	11 died early	---
982.--p-DI-n-BUTYLAMINOAZOBENZENE								
Sugiura et al., 1945	12 rats	Sherman	---	4.8 mg. daily in food	P.O.	0	---	496 days
983.--N,N-DIETHANOL-p-AMINOAZOBENZENE								
Sugiura, 1947	Rats	---	---	0.06% in cotton seed oil	P.O.	0	---	250 days

1. Changes in kidney.
2. M.P. 190-1°.
3. 12 cholangiomatous growths and 5 hepatomatous growths (and 2 more possible).
4. 11 cholangiomatous growths and one hepatomatous growth.
5. 6 cholangiomatous growths (and 2 more possible) and one possible hepatomatous growth.
6. In the forestomach.
7. Of the stomach.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
984.--p-DIETHYLAMINOAZOBENZENE 								
Kinosita, 1940a	Rats	---	---	---	P.O.	0	---	---
Sugiura et al., 1945	10 rats	Sherman	---	4.8 mg. daily in food	P.O.	0	---	511 days
Hartwell and Andervont, unpub. results, 1947	20 mice	C	M & F	200 mg. in glycerol susp., 8 inj.	S.C.	0	---	10 mos.
Sugiura, 1947	Rats	---	---	0.06% in cotton seed oil	P.O.	0	---	250 days
985.--p-DIMETHYLAMINOAZOBENZENE 								
Helmholz, 1904a	Rabbits	---	---	Saturated soln. in olive oil	S.C., ear	0[1]	---	17 days
	1 rabbit	---	---	--do--	Lining of bladder	1 pap.	---	22 days
Kinosita, 1936a	Rats	White	---	In olive oil	P.O.	Tumors[2]	---	At least 150 days
Maruya and Tanaka, 1936[4]	Rats	---	---	3% in olive oil, 0.5 cc. weekly	S.C.	5[3]	16 alive at 150 days	At least 280 days
	Rabbits	---	---	In olive oil emulsion	I.V.	0	---	At least 229 days
Maruya and Tanaka, 1936	Rats	White	---	3-10% in olive or sesame oil, 1 cc. every 10 days or 2 weeks	S.C.	Tumors[5]	---	At least 160 days
Mizuta and Maruya, 1936	Mice	---	---	In food	P.O.	Tumors[6]	---	---
Mizutani and Maruya, 1936	--do--			--do--	--do--	Tumors[7]	---	---
Tanaka, 1936	Rabbits	---	---	2 or 3% in olive or sesame oil, every 10 or 14 days	I.V.	1[8]	---	144 days
Kagawa[9]	Rats	---	---	In food	P.O.	Tumors[10]	---	---
Kawabata, 1937	Rats	White	---	0.02-0.06% in food	P.O.	Tumors[11]	---	75 days
Kinosita, 1937	Rats	White stock	---	0.06% in food	P.O.	Tumors[12]	---	---
	--do--	--do--	---	1% in food	--do--	---	38% alive at 50 days	291 days
	Rats	Stock	---	In food	P.O.	Tumors[13]	---	230 days

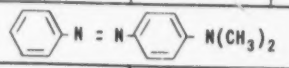
1. Slight hyperplasia observed.
2. Hepatomas, majority within 100 days, nearly all within 150 days. Metastases to abdominal lymph glands.
3. Hepatomas; metastases to omentum, mesenteric lymph gland, etc.
4. Cited by Kinosita, 1937.
5. Liver cancers beginning at 160 days.
6. Changes in liver noted.
7. Enlarged livers and atypical increase of epithelial cells of the bile duct.
8. Of the lung, not stated to be malignant. Other examples of atypical proliferation of lung epithelium.
9. Cited by Kinosita, 1937.
10. Of the liver and stomach. The simultaneous application of cholic acid in other animals increased incidence of stomach tumors but not of liver tumors.
11. 3 hepatomas and 2 adenomas in 5 animals sacrificed at 50 days.
12. Of the liver, chiefly; metastases.
13. Of the liver, if fed the dye for at least 50 days.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
985.--p-DIMETHYLAMINOAZOBENZENE (Continued)								
Kinosita, 1937 (Continued)	Rats	---	---	In cholesterol	Liver	0	---	---
	--do--	---	---	--do--	Kidney	0	---	---
	Rabbits	---	---	--do--	Under periosteum	0	---	---
	--do--	---	---	--do--	Bone marrow	0	---	---
	--do--	---	---	--do--	Brain	0	---	---
	Pigeons	---	---	--do--	--do--	0	---	---
	Toads	---	---	--do--	I.M.	0	---	---
	Mice	---	---	In olive oil	---	0	---	---
	Rats(?)	---	---	In aqueous soln. as the hydrochloride	S.C.	0	---	---
	Rats	---	---	--do--	P.O.	0	---	---
Kobata, 1937	Rats	---	---	In food	P.O.	14[1]	---	At least 170 days
Maruya and Tanaka[2]	Rat	---	---	In olive oil, repeated inj.	S.C.	1 sarc.	---	At least 325 days
Morigami and Enomoto[2]	Fowls	---	F	In food	P.O.	0[1]	---	At least 1 year
Nonaka[2]	Mice	---	F	In cholesterol, single inj.[3]	Uterus	0	---	At least 90 days
	--do--	---	F	In olive oil, repeated inj.[3]	--do--	0	---	--do--
Okada[2]	Rats	---	---	In food	P.O.	Tumors[4]	---	Over 14 weeks
Sato and Hashimoto[2]	Rabbits	---	---	In food	P.O.	0	---	At least 193 days
Tanaka[2]	Rats	---	---	In olive oil	Lungs and testes	0	---	15 mos.
	Rabbits	---	---	In benzene	Skin	0	---	At least 100 days
Maruya, 1938	110 rats	White	M & F	0.06% in food	P.O.	0[5]	---	291 days
Masayama et al., 1938	Rats	---	---	In food for 12 to 202 days	P.O.	Tumors[6]	---	At least 209 days
Morikami[7]	Fowls	---	F	In food	P.O.	0[8]	---	2 years
Nakahara and Fujiwara, 1938	57 rats	White	M & F	2.5% in olive oil, 0.5 or 1 cc. weekly	I.P.	3[8]	37 died early	279 days
Nakahara et al., 1938	50 rats	---	M & F	0.1-0.6% in food	P.O.	8[9]	23 alive at 162 days	162 days
Nakamura et al., 1938	Rats	White	---	3-10 mg. every 7 to 10 days	I.V., tail	0[1]	---	100 to 150 days
	Rabbits	---	---	30 to 100 mg. every 7 to 10 days	I.V., ear	--do--	---	260 days

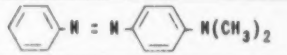
1. Changes in liver noted.
2. Cited by Kinosita, 1937.
3. Animals also received simultaneous injections of estrone.
4. Hepatomas. Other animals given arsenic or phosphorus, developed hepatomas in a slightly shorter time.
5. Changes in kidney described.
6. Of the liver in 130 to 209 days.
7. Unpublished results cited by Kinosita, 1938a.
8. Of the liver, one with metastases, also liver cirrhosis.
9. Hepatomas and cholangiomas or both; one with metastases; also cirrhosis.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
985.--p-DIMETHYLAMINOAZOBENZENE (Continued)								
Tanaka, 1938	Rats	White	---	In olive oil	S.C.	1 sarc.[1]	21 alive at 150 days	At least 10 mos.
Ishiwara and Saga, 1939	Rats	White	---	In food	P.O.	6[2]	6 alive at 100 days	At least 100 days
Kawaji, 1939	30 rats	White	---	0.06% in food	P.O.	0[3]	---	150 days
Kinosita, 1939	Rats	---	---	In food[4]	P.O.	0[5]	---	12 weeks
Maisin et al., 1939c	200 rats	---	---	0.01 gm. in food daily[6]	P.O.	0[7]	52 alive at 220 days	220 days
	75 rats	---	---	--do--[8]	P.O.	25[9]	15 alive at 120 days	130 days
Maruya, 1939	75 rats	---	---	0.06% in food	P.O.	Hepatomas	Many killed early	Over 160 days
	Rats	---	---	0.006% in food	P.O.	2 hepatomas	---	At least 371 days
Nakahara et al., 1939a	40 rats	White	M & F	0.01 to 0.06% in food	P.O.	9[10]	High early mortality	162 days
	57 rats	White	--do--	2.5% in olive oil, 0.5 to 1 cc. weekly	I.P.	3[11]	6 alive at 255 days	279 days
Nakahara et al., 1939b	Rats	---	---	In olive oil	I.P.	3 Hepatomas	6 alive at 255 days	279 days
	50 rats	---	M & F	0.2 to 0.6% in food	P.O.	11[12]	---	150 days
Nakahara et al., 1939c	Rats	---	---	0.5 to 0.6 gm. total dose, in food[3]	P.O.	119[13]	229 alive at 150 days	150 days
Nakahara et al., 1939d	Rats	White	---	0.02 to 0.06% in food[14]	P.O.	Tumors[15]	---	150 days
Nishiyama et al., 1939	Rats	---	---	0.06% in food	P.O.	Tumors[16]	---	Over 90 days
Nonaka, 1939	Rats	White	---	3% in sesame oil, 0.05 cc. weekly[17]	Uterus, mammary gland	0	---	---
Sasaki and Nagao, 1939	38 rats	---	---	0.06% in food	P.O.	26[18]	---	---
	16 rats	---	---	0.006% in food	P.O.	0	---	At least 400 days

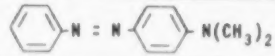
1. Also 6 hepatomas.
2. Of the liver. Other animals fed various diets had different incidence of tumors.
3. Cirrhosis of the liver; some cystomas. Other animals fed added cholesterol, lecithin and sucrose developed pathological changes at different rates.
4. Different diets used.
5. Hepatomatous changes in the liver observed.
6. Animals fed also whole rye flour.
7. One hepatoma, but a *taenia crassicolis* was observed in the liver.
8. Animals fed also polished rice.
9. Of the liver.
10. Of the liver, also cirrhosis.
11. Of the liver, one with metastases, also liver cirrhosis.
12. Hepatomas.
13. Hepatomas; cirrhosis appeared at 50-60 days.
14. Different materials added to diet.
15. Of the liver in 50 to 100% of animals.
16. Hepatomas or cholangiomas beginning at about 90 days.
17. Other animals which received also simultaneous injections of estrone benzoate failed to develop tumors.
18. Liver carcinoma beginning at about 90 days.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
985.--p-DIMETHYLAMINOAZOBENZENE (Continued) 								
Araki and Shirota, 1940	Rats	---	---	In food[1]	P.O.	Hepatomas	---	At least 120 days
Brock et al., 1940	83 rats	Stock	M & F	Ca 2 mg. per day in food[2]	P.O.	12[3]	14 died in 2 mos.	2 years
Ishiwara and Saga, 1940	Rats	---	---	0.06% in food[4]	--do--	7	10 alive at 100 days	285 days
	--do--	---	---	--do--[5]	--do--	6	6 alive at 100 days	206 days
	--do--	---	---	--do--[6]	--do--	5	6 alive at 100 days	296 days
	--do--	---	---	--do--[7]	--do--	5	6 alive at 100 days	198 days
	--do--	---	---	--do--[8]	--do--	5	6 alive at 100 days	165 days
	--do--	---	---	--do--[9]	--do--	20	30 alive at 100 days	330 days
	--do--	---	---	--do--[10]	--do--	0	29 alive at 100 days	270 days
	--do--	---	---	--do--[11]	--do--	6	8 alive at 100 days	204 days
	--do--	---	---	--do--[12]	--do--	6	12 alive at 100 days	293 days
	--do--	---	---	--do--[13]	--do--	5	6 alive at 100 days	273 days
Kensler et al., 1940	Rats	---	---	0.06% in food	P.O.	Tumors[14]	---	110 days
Kinosita, 1940a	Rats	Stock	---	0.006% in food	P.O.	Tumors[15]	---	Over 379 days
	Squirrels	---	---	---	P.O.	0	---	2 years
	Fowls	---	---	---	P.O.	0	---	2 years
	--do--	---	---	In olive oil	Fallopian tube	Adenomas	---	---
	Rabbits	---	---	---	P.O.	0[16]	---	---
	--do--	---	---	---	Skin	0	---	---
	Mice	---	---	---	--do--	0	---	---
	Rats	---	---	In olive oil	S.C.	1 sarc.[17]	---	---
	--do--	---	---	As pellet or in olive oil	Kidney, lung, periosteum, bone marrow, brain, muscle, mammary gland, testis, liver.	0	---	---

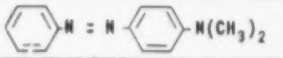
1. Other animals, fed also copper sulfate, had lower mortality rate and developed tumors at a slightly earlier date.
2. Different diets used.
3. Primary liver carcinoma, first at 360 days; also liver adenoma.
4. Diet of unpolished rice.
5. Standard diet.
6. Protein rich diet.
7. Carbohydrate rich diet.
8. Fat rich diet.
9. With 1500 added units of Vitamin A.
10. With 5900 added units of Vitamin A.
11. With added Vitamin A and B.
12. With 100 added units of carotin.
13. With 10 added units of Vitamin D.
14. Of the liver.
15. Of liver; latent period 379 days.
16. Epithelial proliferation of the bile duct.
17. Also liver tumors.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
985.--p-DIMETHYLAMINOAZOBENZENE (Continued) 								
Kishi and Nakahara, 1940	Rats	---	---	In food	P.O.	Hepatomas	---	150 days
Korosteleva and Shabad, 1940	26 guinea pigs	---	---	1% in olive oil; 0.1 cc., 2 inj.	S.C.	0	---	At least 30 days
	20 guinea pigs	---	---	5% in olive oil, repeated injections	S.C.	0	---	At least 30 days
Korosteleva, 1940a	Mice	---	---	---	---	Tumors[1]	---	---
Korosteleva, 1940b	Rat	---	---	---	P.O.	Tumors[2]	---	---
Maisin, 1940	200 rats	---	---	0.01 g. daily in food[3]	P.O.	1 (?)[4]	85 alive at 120 days	220 days
	75 rats	---	---	--do--[5]	--do--	25 hepatomas	15 alive at 120 days[6]	120 days
Maruya, 1940	175 rats	---	M & F	0.06% in food	P.O.	Tumors[7]	High mortality	160 days
	20 rats	---	--do--	0.006% in food	P.O.	2[8]	---	379 days
	20 rats	---	--do--	0.002% in food	P.O.	0	---	400 days
Maruya and Yamasaki, 1940	Rats	---	---	In food	---	Hepatomas[9]	---	---
Masayama and Yokoyama, 1940	Rats	---	---	In food	P.O.	Tumors[1]	---	Over 134 days
Masayama et al., 1940	25 rats	---	---	5 mg. in food daily	P.O.	5[10]	6 alive at 140 days	140 days
	--do--	---	---	--do--[11]	P.O.	11[10]	13 alive at 140 days	--do--
Mizuta and Nagasima, 1940	Rats	---	---	In food	---	Hepatomas	---	---
Mori and Nakahara, 1940a	50 rats	---	M & F	12.5 mg. in olive oil weekly	I.P.	2[12]	8 alive at 200 days	200 days
	--do--	---	--do--	--do--[13]	--do--	0[14]	27 alive at 200 days	--do--
Mori and Nakahara, 1940b	70 rats	---	---	2.5% in olive oil, 0.5 cc. weekly[5]	I.P.	45[15]	---	200 days
	70 rats	---	---	--do--[16]	--do--	0	---	--do--
	193 rats	---	---	--do--[17]	--do--	109[18]	---	--do--

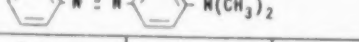
1. Of the liver.
2. Carcinoma and cholangioma of liver; tumor of stomach.
3. Diet of whole wheat flour.
4. Hepatoma, between 200 and 220 days.
5. Diet of polished rice.
6. First at 62 days; hepatomas in all alive at 120 days.
7. Hepatomas, adenomas; metastases to abdomen.
8. Hepatomas, first at 368 days.
9. Histologic studies.
10. Liver cancer.
11. Plus 2.5 mg. anthranilic acid, daily in food.
12. Of the liver; 9 cases of cirrhosis.
13. Animals fed liver.
14. No cirrhosis.
15. Hepatomas; also 22 with liver cirrhosis.
16. Cow's liver added to diet.
17. Other substances added to diet.
18. Hepatomas, also 74 with liver cirrhosis.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
985.--p-DIMETHYLAMINOAZOBENZENE (Continued) 								
Nakahara et al., 1940	Rats		M & F	0.02-0.06% in food	P.O.	154[1]	232 alive at 150-152 days	150-152 days
	--do--	---	--do--	--do--[2]	P.O.	0	5% alive at 150-200 days	150-200 days
Nonaka, 1940	Rats	Stock	---	3% soln. 0.05 cc. weekly	Uterine wall	0	---	---
	Mice	--do--	---	--do--	--do--	0[3]	---	---
	--do--	--do--	---	3% soln. 0.1 cc. weekly	S.C.	--do--	---	---
	Rats	--do--	---	3% soln. 0.1 cc. weekly	Mammary gland	0	---	---
	Mice	--do--	---	---	P.O.	0	---	---
	--do--	--do--	---	0.3% soln.; 0.05 cc. weekly	Uterine wall	0[3]	---	---
	--do--	--do--	---	0.3% soln. 0.1 cc. weekly	S.C.	0	---	---
Ohta, 1940b	57 rats	--	---	0.06% in food	P.O.	3[4]	5 alive at 18 weeks	18 weeks
	103 rats	---	---	--do--[5]	P.O.	2[4]	--do--	--do--
Orr, 1940	100 rats	---	---	0.06-0.09% in food	P.O.	43[6]	Many killed early	11 mos.
	--do--	---	---	--do--	P.O.	---	--do--	207 days
	60 guinea pigs	---	---	0.06-0.8% in food	P.O.	0[7]	---	18 mos.
Araki et al., 1941	Rats	White	---	0.06% in food[8]	P.O.	Tumors[9]	---	At least 204 days
Baumann et al., 1941	Rats	---	---	1 mg. in colloidal susp. in aq. gelatin soln. weekly	I.P.	0	---	8 weeks
Bonne et al., 1941	Rats	---	---	0.06% in food[10]	P.O.	Carc.[11]	---	At least 40 weeks
Edwards and White, 1941a	Over 200 rats	Osborne-Mendel	M & F	In food	P.O.	Tumors[12]	---	---
Edwards and White, 1941b	106 rats	--do--	---	0.06% in food	--do--	Tumors[13]	---	Up to 52 weeks
Gyorgy et al., 1941	Several hundred rats	---	---	0.06% in food[10]	P.O.	Carc.	---	175 days
Hamperl, 1941	Rats	---	---	In food	P.O.	Tumors[14]	---	At least 1½ years
	Rabbits	---	---	--do--	P.O.	0	---	---
Kasiwabara; 1941	100 rats	White	---	0.06% in food[15]	P.O.	4[16]	95 died in 158 days	165 days

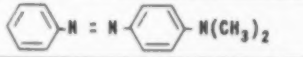
1. Liver cancer; one case of lung metastasis.
2. With liver feeding.
3. Myeloid changes observed.
4. Liver cancer.
5. Also injected with gum acacia soln. weekly.
6. Malignant tumors of liver in 136 rats examined; first at 4 mos., also other non-malignant cystadenomas.
7. No liver changes observed.
8. In some diets added amounts of zinc chloride.
9. Of the liver--cholangiomas, hepatomas, and carcinomas.
10. Different diets.
11. Of the liver.
12. Of the liver; various types.
13. Of the liver; also papillomas of forestomach (4 cases); metastases to lung.
14. Cancer of the liver after 1½ years.
15. Two diets used.
16. Hepatomas; also cirrhosis in other animals.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
985.--p-DIMETHYLAMINOAZOBENZENE (Continued) 								
Kensler et al., 1941b	181 rats	---	---	0.06% in food[1]	P.O.	Tumors[2]	---	150 days
Kensler et al., 1941a	45 rats	---	---	In food	P.O.	Tumors[3]	---	150 days
Law, 1941	Over 29 mice	C57 bl.	M & F	5 mg. (total dose) in olive oil plus 5 mg. pellet	S.C.	6 sarc.	29 alive at time of first tumor	---
	30 mice	Dba	--do--	--do--	--do--	1 sarc.[4]	---	At least 476 days
Maruya et al., 1941	Rats	---	---	0.09 g. (total dose) as aq. emulsion with starch or gum arabic	P.O.	1[5]	4 alive at 40 days	40 days
Masayama et al., 1941	15 rats	White	---	In food[6]	P.O.	7 hepatomas	7 alive at 150 days	150 days
Miller et al., 1941	10 rats	Albino	---	0.06% in food[7]	P.O.	Tumors[8]	---	At least 6 mos.
Miyake and Araki, 1941	Rats	White	---	0.06% in food[9]	P.O.	Tumors[10]	---	---
Mori, 1941c	40 rats	Albino	M & F	0.02-0.06% in food[11]	P.O.	6[12]	8 alive at 150 days	150 days
Mori, 1941d	206 rats	White	---	In food[13]	P.O.	52[10]	---	150 days
Morigami and Kasiwabara, 1941	100 rats	Albino	M & F	0.06% in food[1]	P.O.	4[14]	15 alive at 165 days	165 days
Morigami et al., 1941	Rats	White	---	0.06% in food[15]	P.O.	4 hepatomas	45 died in 158 days	165 days
	20 rats	--do--		0.06% in food[15] for 100 days	P.O.	6 hepatomas[16]	14 died in 100 days, 6 alive at 208 days	208 days
Morozenskaya, 1941	25 rats	---	---	0.5 gr. in oil soln.	P.O.[17]	4[18]	---	2 years
	101 mice	Pb & Nem	---	1% benzene soln. (180 mg. per mouse)	Skin	Hepatoma[19]	---	--do--
Orr and Strickland, 1941	Rats	Stock	---	0.6 or 0.9% in food	P.O.	Carc.[20]	---	Over 5 mos.
	--do--	---	---	In food[1]	P.O.	0	---	15 mos.

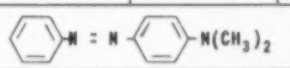
1. Different diets.
2. Liver cancer.
3. Hepatomas, cholangiomas, and cirrhosis.
4. In 476 days; also one hepatoma.
5. Hepatomas; no cirrhosis.
6. Inhibitory action of anthranilic acid studied.
7. Normal diet; other diets studied.
8. Of the liver after 4 mos.
9. In some diets with added amounts of aluminum sulfate.
10. Of the liver; cholangiomas and hepatomas; metastases to mesentery, diaphragm, lymph nodes, etc.
11. Other rats fed also cystine developed tumors similarly.
12. Hepatomas; 1 before 150 days.
13. Different organs added to diet.
14. Liver-cell carcinoma.
15. Rice diet. Other diets showed reduction in tumor incidence.
16. 4 with metastases.
17. By stomach tube.
18. 2 sarcomata, one cancer of the lung.
19. Benign tumors of the hepatic cells.
20. Of the liver; hemangiomas, first in 5th month; hepatomas later.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
985.--p-DIMETHYLAMINOAZOBENZENE (Continued) 								
Polettini, 1941a	23 rats	White	---	0.06-0.12% in olive oil	P.O.	12 hepatomas[1]	---	209 days
Sato and Morigami, 1941	20 rats	---	M & F	Ca. 25 mg. daily in food[2]	P.O.	4 hepatomas	10 alive at 200 days	220 days
	25 rats	---	---	0.06% in food for 67 days	P.O.	5 hepatomas	24 alive at 67 days, 5 alive at 194 days	194 days
Sugiura, 1941	40 rats	---	---	0.06% in food	P.O.	6[3]	---	150 days
Sugiura and Kensler, 1941	Rats	Sherman, Wistar, Evans	---	0.06% in food	P.O.	Tumors[4]	---	At least 220 days
Sugiura and Rhoads, 1941	146 rats	Sherman,	M & F	0.06% in food[5]	P.O.	95[6]	Many killed early	220 days
	144 rats	Wistar,	--do--	--do--[5]	--do--	88[6]	--do--	--do--
	132 rats	Evans	--do--	--do--[5]	--do--	55[7]	--do--	--do--
White, J., 1941	247 rats	Osborne-Mendel	---	0.06% in food[8]	P.O.	0	---	120-130 days
Antopol and Unna, 1942	44 rats	Wistar	---	0.02% in food[9]	P.O.	2 carc.[10]	---	At least 169 days
Cohen et al., 1942	39 rats	Sprague-Dawley	M & F	0.06% in food	P.O.	12[11]	20 alive at 60 days	200 days
Guyer and Claus, 1942	Rats	---	---	In food	P.O.	Tumors[10]	---	1-6½ mos.
György et al., 1942	Rats	---	---	0.06% in food[12]	P.O.	Hepatomas[13]	---	At least 150 days
Langer, 1942	Rats	---	---	---	P.O.	0	---	---
Ovalle, 1942	185 rats	Evans, Wistar & Sherman	---	3% in olive oil with unpolished rice	P.O.	Tumors[14]	---	220 days
Sugiura and Rhoads, 1942	Rats	Sherman	M	0.06% in food[15]	P.O.	Tumors[16]	---	131 days
Taylor and Pollack, 1942	17 rats	Wistar	---	0.6% in diet	P.O.	Hepatomas	---	162 days

1. 9 with metastases.
2. Anti-carcinogenic effect of β-sitosterol and of ergosterol.
3. Liver cancer; also 6 animals with cholangioma or hepatoma; metastases. First tumor at 68 days.
4. Liver cancers of different types.
5. Other experiments reported using different dietary supplements.
6. Of the liver, beginning at 41-60 days.
7. Of the liver beginning at 76-90 days.
8. Along with different sulphur-containing substances. Growth studied.
9. Other animals received riboflavin; pathological effect on liver retarded.
10. Of the liver.
11. Hepatomas and cholangiomas, chiefly mixed.
12. Different diets.
13. Malignant.
14. Primary cancer of the liver in Evans rats at 81 days, in Wistar at 92 days, in Sherman at 49 days. All Wistar and Sherman rats developed primary cancer of the liver between 92 and 194 days. 15% of Evans rats lived 161-200 days without developing cancer of the liver.
15. No difference in effect of purified dye. M.P. 118°.
16. Hepatomas and cholangiomas. Metastases to mesentery, omentum and lung.

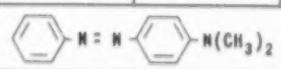
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
985.--p-DIMETHYLAMINOAZOBENZENE (Continued) 								
du Vigneaud et al., 1942	Rats	---	---	0.06% in food[1]	P.O.	0	---	230 days
White and Edwards, 1942b	87 rats[2]	Osborne-Mendel	M & F	0.06% in food[3]	P.O.	84[4]	4 died in 4 mos.	500 days
	80 rats[2]	--do--	--do--	--do--[5]	--do--	48[4]		
White and Edwards, 1942c	80 rats	--do--	M	0.06% in food	--do--	48[6]	---	16 mos.
Williams et al., 1942	100 rats	Rockland & Med. College of Virginia	---	0.06% in food[7]	P.O.	Carc.[8]	15 died early	At least 6 mos.
Andervont and Edwards, 1943a	34 mice	C	M & F	5 mg. in olive oil, monthly, 9 times	S.C.	0[9]	32 alive at 1 year	1 year
Burk et al., 1943	Rats	---	---	0.1% i food[10]	P.O.	Carc.[8]	---	At least 180 days
Dickens and Weil-Malherbe, 1943	60 rats	Black-hooded	---	0.06% in food	P.O.	19[6]	30 died within 100 days. 22 alive at 140 days	236 days
Druckrey, 1943	700 rats	---	---	0.1-30 mg. in bread	P.O.	Tumors[11]	---	100 days
Miner et al., 1943	30 rats	---	---	0.06% in food for 120 days[12]	P.O.	16[8]	29 alive at 4 mos.	6 mos.
Polettini, 1943	27 rats	White	---	In food	P.O.	100%	---	153 days
Reimann et al., 1943	36 rats	---	---	0.02-0.08% in food for 75 days[13]	P.O.	0	---	11 mos.
	19 rats	---	M & F	--do--[14]	P.O.	5 hepatomas	---	205 days
	10 rats	---	---	--do--[15]	P.O.	1 hepatoma	---	222 days
	35 rats	---	---	--do--[16]	P.O.	5 hepatomas	---	Ca. 210 days
Smith et al., 1943	47 rats[17]	Wistar	M & F	0.1% in food[10]	P.O.	11[18]	---	133 days
Sugiura et al., 1943	Rats	---	---	0.06% in food[10]	P.O.	Tumors[8]	---	At least 150 days
Woodard, 1943	Rats	Albino	M & F	0.06% in food	P.O.	Tumors[8]	---	272 days
Andervont et al., 1944	20 mice	C	M & F	0.06% in food	P.O.	1 hepatoma[19]	---	270 days

1. Different diets used. Procarcinogenic effect of biotin noted.
2. Alive at 120 days.
3. On high cysteine diet.
4. Of the liver; carcinoma and hepatoma.
5. On low cysteine diet.
6. Of the liver, malignant.
7. Some of animals subjected to X-rays.
8. Of the liver.
9. No hepatic changes, pulmonary tumors or hemangio-endotheliomas.
10. Different diets.
11. First at 60 days.
12. Other animals given diets designed to test effect of different B vitamins.
13. Polished rice diet.
14. Unpolished rice diet.
15. Biotin added to diet.
16. Diet of different vitamin content.
17. Surviving.
18. Adenocarcinoma of the liver.
19. In females.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
985.--p-DIMETHYLAMINOAZOBENZENE (Continued) 								
Field et al., 1944	Rats	---	---	0.06% in food for 4 mos.	P.O.	Tumors[1]	---	Over 4 mos.
Kirby, 1944	Rats	Alstar	---	0.06% in food	P.O.	Tumors[2]	---	7 mos.
Miller, J. A. et al., 1944a	30 rats	Sprague-Dawley	---	0.06% in food[3]	P.O.	15[1]	26 alive at 4 mos.	6 mos.
	90 rats	--do--	---	--do--[4]	P.O.	1[7]	65 alive at 4 mos.	--do--
Miller, J. A. et al., 1944b	227 rats	--do--	---	0.06% in food for 120 days[5]	P.O.	99 hepatomas	211 alive at 4 mos.	6 mos.
Opie, 1944	50 rats	---	---	0.06% in food[6]	P.O.	19[7]	---	At least 5 mos.
Popper et al., 1944	287 rats	---	---	0.06%	P.O.	0	Killed after 150 days	228 days
Sugiura, 1944	20 rats	---	---	3% in cottonseed oil[8]	P.O.	Tumors[1]	---	At least 200 days
Cohen, 1945	28 rats	Sprague-Dawley	---	0.06% in food	P.O.	17[9]	---	200 days
Glese et al., 1945	83 rats	Albino	---	0.045 to 0.060% in food 2½-3½ mos.	P.O.	28[1]	69 alive at 2½-3½ mos.	5½ mos.
Kirby, 1945b	14 mice[10]	Mixed	M	7.5 mg. in arachis oil, every 2 weeks[6]	S.C.	2 sarc.[11]	10 alive at 250 days	At least 432 days
	--do--	--do--	F	--do--	S.C.	0	5 alive at 250 days	438 days
	22 mice[10]	Ibm	M	--do--	S.C.	0[12]	14 alive at 250 days	426 days
	4 mice[10]	--do--	F	7.5 mg. in arachis oil, every 2 weeks[13]	S.C.	0	0 alive at 250 days	---
	12 mice[10]	C57 bl.	M	7.5 mg. in arachis oil, every 2 weeks[6]	S.C.	0	3 alive at 250 days	474 days
	12 mice[10]	--do--	F	--do--	S.C.	1 sarc.[14]	5 alive at 250 days	At least 615 days
Kline et al., 1945	90 rats	Sprague-Dawley	M	0.06% in food[6]	P.O.	24[1]	72 alive at 6 mos., 7 neg. alive at 6 mos.	6 mos.
Miller, E. C. et al., 1945	96 rats	Sprague-Dawley	M & F	0.06% in food[6]	P.O.	61[1]	88 alive at 6 mos., 23 neg.	6 mos.

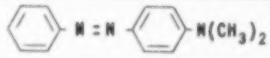
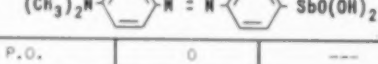
1. Of the liver.
2. Malignant hepatomas.
3. Corn oil in diet.
4. Hydrogenated coconut oil in diet.
5. Different lipids in diet.
6. Different diets.
7. Hepatomas, cystadenomas, cholangiomas.
8. Diet of whole dried milk.
9. Liver tumors, malignant.
10. Number examined post mortem.
11. First at 344 days; also 2 liver tumors, first at 429 days.
12. 3 liver tumors, first at 515 days.
13. Restricted diet.
14. At 321 days. Also 4 liver tumors, first at 446 days.

985.--p-DIMETHYLAMINOAZOBENZENE (Continued)

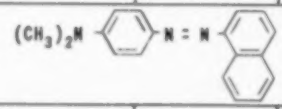
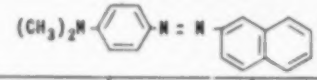
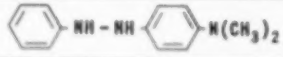
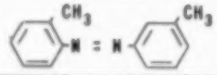
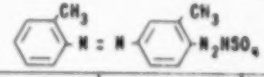


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Miller, J. A. et al., 1945	6 rats	Albino	---	0.06% in food	P.O.	0	---	6 weeks
Miller, J. A. and Baumann, 1945	10 rats	Albino	---	0.06% in food for 4 mos.	P.O.	8[1]	6 alive at 6 mos.	6 mos.
	10 rats	--do--	---	0.006% in food for 8 mos.	P.O.	0	8 alive at 10 mos.	10 mos.
Sugiura et al., 1945	34 rats	Sherman	---	4.8 mg. in food daily	P.O.	34[2]	---	280 days
Hoch-Ligeti, 1946	88 mice	Albino	M & F	0.06% in arachis oil[3]	P.O.	Tumors[4]	---	465 days
Kline et al., 1946a	150 rats	Sprague-Dawley	M	0.06% in food for 4 mos.[5]	P.O.	73 hepatomas	69 alive at 6 mos.	6 mos.
Kline et al., 1946b	90 rats	--do--	M	0.06% in food for 4 mos.[5]	P.O.	51 hepatomas	21 neg. alive at 6 mos.	6 mos.
Miller and Baumann, 1946	15 rats	--do--	M	0.06% in food[5]	P.O.	9 hepatomas	All alive at 14 weeks	22 weeks
	26 rats	--do--	M & F	1.72-2.12 millimols[6]	P.O.	16 hepatomas	---	22 weeks
Roussy and Guerin, 1946	20 mice	---	---	0.5 mg. daily in food	P.O.	0	5 alive at 1 year	1 year
	20 rats	---	---	2.5 mg. daily in food	P.O.	0	7 alive at 1 year	At least 29 mos.
	20 mice	---	---	1.5 mg. daily in food	P.O.	1[1]	15 alive at 14½ mos.	14½ mos.
	40 rats	---	---	7.5 mg. daily in food	P.O.	0	30 alive at 1 year	At least 17 mos.
	20 mice	---	---	1% in benzene, 1 or 2 drops twice weekly	Skin	1 sarc.	5 alive at 1 year	At least 23 mos.
	--do--	---	---	3% in benzene, 1 or 2 drops twice weekly	Skin	0[7]	17 alive at 1 year	At least 2 years
	--do--	---	---	3% in benzene, 1 or 2 drops twice weekly	Skin	2 sarc.[8]	12 alive at 20 mos.	20 mos.
Harris, P. N., 1947	160 rats	Wistar	---	0.06% + 15% dried egg albumin	P.O.	2 hepatomas	---	At least 600 days
Harris et al., 1947a	943 rats	Wistar	---	0.6 mgm.-0.9 mgm. in cottonseed oil in food[5]	P.O.	579[9]	---	At least 72-222 days
Harris et al., 1947b	275 rats	Wistar	---	3 gm. in cottonseed oil in food[10]	P.O.	142 hepatomas	---	At least 400 days
Hoch-Ligeti, 1947	Rats	Albino	M & F	0.06 g. in arachis oil	P.O.	80-100%[1]	---	At least 400 days

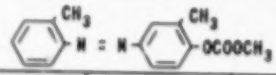
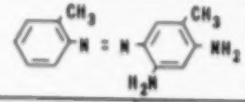
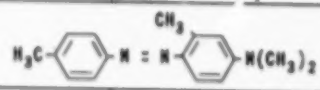
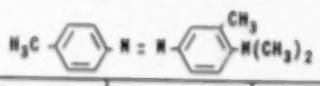
1. Of the liver.
2. Cancer of the liver, with metastases.
3. Effect of fresh milk on production of hepatic tumors.
4. Cholangiomas and hepatomas.
5. Different diets.
6. Paired feeding.
7. But one epithelioma of stomach and one lung tumor.
8. One with metastases to axillary ganglions, mediastinum and lungs.
9. Adenocarcinomas, malignant hepatomas.
10. Effect of biotin in diet.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
985.--p-DIMETHYLAMINOAZOBENZENE (Continued) 								
Kirby and Peacock, 1947	15 rats	Wistar	M & F	0.06% in food	P.O.	Hepatomas	---	At least 40 weeks
Maisin and Beeckmans, 1947	30 rats	---	---	---	P.O.	16[1]	---	480 days
	--do--	---	---	---	P.O.	0	---	--do--
	--do--	---	---	---	P.O.	Tumors	---	--do--
Morrione, 1947	38 rats	Albino	M	3% in olive oil	P.O.	28[2]	---	At least 7 mos.
Silverstone and Tannenbaum, 1947	24 rats	---	---	0.06% in food	P.O.	Tumors	---	2-4 mos.
Sugiura, 1947	Rats	---	---	0.06% in cottonseed oil	P.O.	Tumors[3]	---	250 days
986.--4-DIMETHYLAMINOAZOBENZENE-4'-ARSONIC ACID								
Nishiyama et al., 1939	73 rats	---	---	0.009% to 0.09% in food	P.O.	0[4]	23 alive at 200 days	400 days
	7 rats	---	---	1 to 5 mg. per 100 gm. body weight, repeated injections	Inj.	0	---	---
	6 rats	---	---	--do--	I.P.	0	---	At least 508 days
Sasaki and Nagao, 1939	37 rats	---	---	0.09% in food	P.O.	0[5]	17 died in 60 days	209 days
	19 rats	---	---	0.18% in food	P.O.	0[5]	7 alive at 200 days	At least 335 days
	17 rats	---	---	0.009% in food	P.O.	--do--	15 alive at 200 days	At least 400 days
	7 rats	---	---	1 to 5 mg. in olive oil, repeated injections	S.C.	0	---	At least 554 days
	6 rats	---	---	--do--	I.P.	0	---	--do--
987.--4-DIMETHYLAMINOAZOBENZENE-4'-STIBINIC ACID 								
Nagao, 1941c	Rats	White	---	1.05% to 2.1% in food	P.O.	0	---	Ca. 400 days
988.--4-DIMETHYLAMINOAZOBENZENE-4'-SULFONIC ACID, SODIUM SALT								
Kinosita, 1940b	Rats	---	---	In food	P.O.	0	---	---
Nagao, 1941c	Rats	---	---	---	P.O.	0	---	---

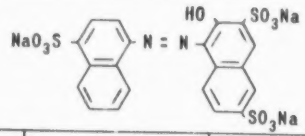
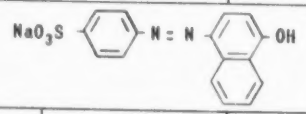
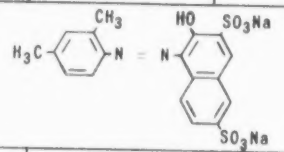
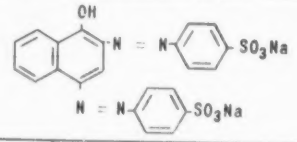
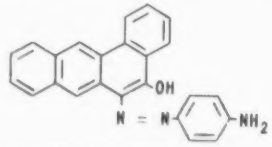
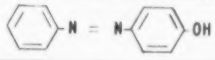
1. Of the liver.
2. 3 liver-cell carcinomas; one bile duct carcinoma; 12 hepatomas; 12 adenomata of the bile duct and cystadenomata.
3. Cholangiomas and hepatomas.
4. Secondary liver cirrhosis.
5. Hyperplasia of the bile duct epithelium.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
989.--p-DIMETHYLAMINOBENZENEAZO-1-NAPHTHALENE 								
Miller and Baumann, 1945	10 rats	Albino		0.075% in food for 8 mos.	P.O.	0	8 alive at 10 mos.	10 mos.
990.--4-DIMETHYLAMINOBENZENE-1-AZO-2-NAPHTHALENE 								
Kinosita, 1940b	Rats	---	---	In food	P.O.	0[1]	---	---
991.--p-DIMETHYLAMINOHYDRAZOBENZENE 								
Kinosita, 1940b	Rats	---	---	4 mg. daily in food	P.O.	0	---	200 days
992.--2,3'-DIMETHYLAZOBENZENE 								
Otsuka and Nagao, 1936	30 rats	White	M & F	0.2 to 0.3% in food	P.O.	13 pap.[2]	13 alive at 122 days	342 days
Sellgman and Shear, 1941	20 mice	A	F	0.05 cc. of pure substance (an oil)	S.C.	0	---	18 mos.
Cook et al., 1940a	Mice	---	---	0.3% in benzene twice weekly	Skin	1[3]	---	---
	Mice	---	---	5 mg. in sesame oil	S.C.	1[4]	---	---
	Mice	---	---	Ca 5 mg. weekly	P.O.	--do--	---	---
Korosteleva, 1940b	Rats	---	---	---	P.O.	Pap. and carc.[5]	---	---
Law, 1941c	Over 20 mice	C57 bl.	M & F	5 mg. (total dose) in olive oil and 5 mg. pellet	S.C.	5 sarc.[6]	20 alive at 322 days	Over 322 days
	22 mice	Dba	--do--	--do--	S.C.	0	---	---
Strömbeck, 1946	37 rats	White	---	20% soln. in almond oil, 0.1 cc. daily[7]	P.O.	0	---	545 days
	20 rats	---	---	0.2-0.3% in food[8]	P.O.	5[9]	---	359 days
	Rats[10]	---	---	--do--	P.O.	4 pap.[11]	18 alive at 53-252 days	232 days
993.--2,3'-DIMETHYLAZOBENZENE-4'-DIAZONIUM SULFATE 								
Sellgman and Shear, 1941	20 mice	A	M & F	5 mg. in aqueous soln., repeated inj.	S.C.	0	---	14 mos.

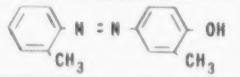
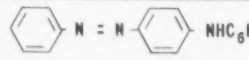
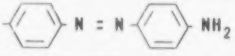
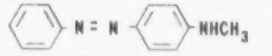
1. Changes in the stomach-wall and bile duct.
2. Of the bladder beginning at 122 days.
3. Possible hepatomatous growth out of 8 livers examined.
4. Possible hepatomatous growth out of 6 livers examined.
5. Of the bladder.
6. First at 322 days, also 2 hepatomas.
7. Satisfactory diet.
8. Inferior diet.
9. Epithelial changes in bladder in 7 rats, including 1 papillomatosis.
10. Part of bladder transplanted to liver.
11. Epithelial changes in bladder in 15 rats.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
994.--2,3'-DIMETHYLAZOBENZENE-4'-METHYLCARBONATE[1] 								
Nagao and Hashimoto, 1939	22 rats	White	---	0.1 to 0.3% in food	P.O.	4 pap.[2]	8 alive at 200 days, 5 alive at 500 days	Over 500 days
996.--2',5-DIMETHYL-2,4-DIAMINOAZOBENZENE 								
Kinosita, 1936a	Rats	White	---	In olive oil	P.O.	0	---	At least 400 days
Meruya, 1938	8 rats	--do--	M & F	0.1% in food	P.O.	0[3]	---	142 days
Kinosita, 1940a	Rats	---	---	---	P.O.	0[4]	---	---
997.--2,4'-DIMETHYL-4-DIMETHYLAMINOAZOBENZENE 								
Nagao, 1940b	53 rats	---	M & F	0.03-0.2% in food	P.O.	0[5]	4 alive at 240 days	435 days
Sasaki et al., 1940a	--do--	---	--do--	--do--	P.O.	1 hepatoma[6]	14 alive at 240 days	610 days
Nagao, 1941b	--do--	---	--do--	--do--	P.O.	1 hepatoma	--do--	--do--
998.--3,4'-DIMETHYL-4-DIMETHYLAMINOAZOBENZENE 								
Nagao, 1940b	36 rats	---	M & F	In food	P.O.	0	2 alive at 399 days	399 days
Sasaki et al., 1940a	--do--	---	--do--	0.03-0.2% in food	--do--	1	---	610 days
Nagao, 1941b	--do--	---	--do--	0.03-0.2% in food	P.O.	0	4 alive at 350 days	610 days
999.--o-Di-n-PROPYLAMINOAZOBENZENE								
Sugiura et al., 1945	10 rats	Sherman	---	4.8 mg. in food daily	P.O.	0	---	207 days

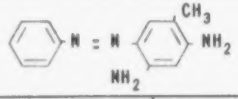
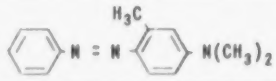
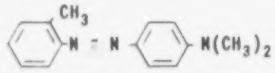
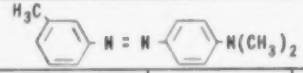
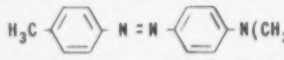
1. Incorrectly called 4'-carbomethoxy-2,3'-dimethylazobenzene.
2. Of the bladder after 500 days.
3. Changes in kidney described.
4. Adenomatous proliferation of the liver.
5. Follicles (called cysts by Edwards) found in hepatic bile duct.
6. At 476 days.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1000.--EDICOL AMARANTH AS 								
Cook et al., 1940a	20 mice	---	---	In aq. soln. 15-20 mg. weekly	P.O.	0[1]	---	477 days
1001.--EDICOL ORANGE IS 								
Cook et al., 1940a	20 mice	---	---	In aq. soln. ca. 15-20 mg. weekly	P.O.	0[2]	---	409 days
1002.--EDICOL PONCEAU RS 								
Cook, 1940a	20 mice	---	---	In aq. soln., ca. 15-20 mg. weekly	P.O.	0[3]	---	773 days
1003.--FAST BROWN G 								
Weyl, 1892	1 dog 1 dog	--- ---	--- ---	2 g. daily 0.1 g. in water 4 times in 22 days	P.O. S.C.	0 0	--- ---	1 mo. 37 days
1004.--3-HYDROXY-4-(p-AMINOPHENYLAZO)-1,2-BENZANTHRACENE 								
Shear and Leiter, 1940	10 mice 10 mice	dba A	M M	1-5 mg. crystals, repeated injection --do--	S.C. S.C.	0 0	8 alive at 15 mos. --do--	15 mos. --do--
Shear, 1941**	10 mice 10 mice	D A	M M	1 mg. crystals, repeated injection 3 mg. crystals, repeated injection	S.C. S.C.	0 0	--- ---	16 mos. --do--
1005.--4-HYDROXYAZOBENZENE 								
Kinosita, 1938b	Rats	---	---	In food	P.O.	Pap.[4]	---	---
Kinosita and Harada, 1938	9 rats	Stock	---	--do--[5]	P.O.	5 pap.[6]	2 died early	284 days

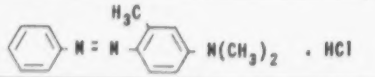
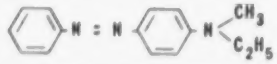
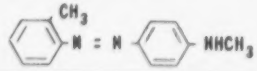
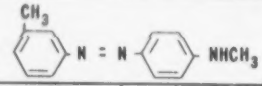
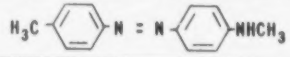
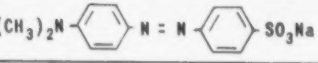
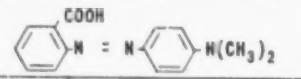
1. No liver lesions in one liver examined.
2. No liver lesions in 3 livers examined.
3. One possible cholangiomatous growth in 5 livers examined. Also one epithelial tumor of doubtful nature in the abdominal cavity.
4. High incidence of multicellular papilloma of the stomach.
5. M.p. 149-151°.
6. Of the stomach; first at 159 days.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1006.--4'-HYDROXY-2,3'-AZOTOLUENE 								
Nagao, 1937	20 rats	---	M & F	0.2-0.3% in food	P.O.	2 pap.[1]	9 alive at 200 days	270 days
Korosteleva, 1940b	Rats	---	---	---	P.O.	Pap.[1]	---	---
Law, 1941c	30 mice	C57 bl.	M & F	5 mg. (total dose) in olive oil, 5 mg. pellet	S.C.	11 sarc.[2]	30 alive at 175 days	Over 175 days
	24 mice	Dba	--do--	--do--	S.C.	0[3]	---	---
Seligman and Shear, 1941	20 mice	C3H	M & F	10 mg. crystals, repeated inj.	S.C.	0[4]	---	15 mos.
1008.--METANIL YELLOW yKS 								
Cook et al., 1940a	30 mice	---	---	In aq. soln. 15-20 mg. weekly	P.O.	0[5]	---	835 days
1009.--4'-METHYL-4-AMINOAZOBENZENE 								
Sugiura et al., 1943	12 rats	Sherman	---	4.8 mg. daily in food	P.O.	1[6]	---	768 days
1010.--N-METHYL-p-AMINOAZOBENZENE 								
Giese et al., 1945	47 rats	Albino	---	0.052-or 0.056% in diet, 2½-3½ mos.	P.O.	27[7]	39 alive at 2½-3½ mos.	5½ mos.
Miller, J. A. and Baumann, 1945	10 rats	Albino	---	0.056% in food for 4 mos.	P.O.	8[7]	8 alive at 6 mos.	6 mos.
Miller, J. A. et al., 1945	6 rats	--do--		0.056% in food[8]	P.O.	0	---	6 weeks
Sugiura et al., 1945	10 rats	Sherman	---	4.8 mg. in food daily	P.O.	10[9]	---	226 days
Miller and Baumann, 1946	85 rats	Sprague-Dawley	M	0.056% in food for 14 weeks[10]	P.O.	57 hepatomas	68 alive at 14 weeks	At least 22 weeks
	60 rats	--do--	M	0.056% for 14 weeks	P.O.	25 hepatomas	59 alive at 13 weeks	At least 22 weeks
	26 rats	--do--	M & F	1.72-2.12 millimols[11]	P.O.	18 hepatomas	---	At least 22 weeks

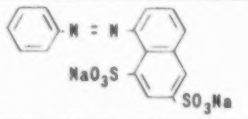
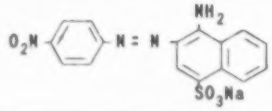
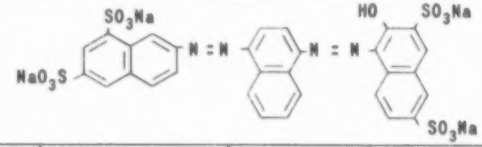
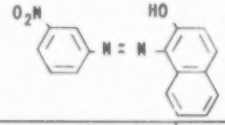
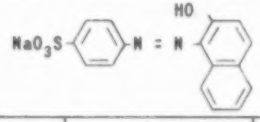
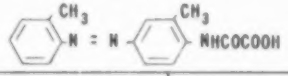
1. Of the bladder.
2. First at 175 days. Also one hepatoma.
3. One hepatoma.
4. Mammary and liver tumors, probably spontaneous.
5. No liver lesions in 4 livers examined.
6. Liver cancer in 427 days.
7. Hepatic.
8. M.P. 88.0°-88.5° Corr.
9. Cancer of the liver, with metastases to mesentery and omentum.
10. Different diets.
11. Paired feeding.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1011.--5-METHYL-2,4-DIAMINOAZOBENZENE 								
Kinosita, 1936a	Rats	White	---	In olive oil	P.O.	0	---	At least 400 days
Maruya, 1938	15 rats	--do--	M & F	0.1% in food	P.O.	0[1]	---	243 days
Kinosita, 1940a[2]	Rats	---	---	---	P.O.	0	---	---
1012.--2-METHYL-4-DIMETHYLAMINOAZOBENZENE 								
Miller and Baumann, 1945	10 rats	Albino	---	0.064% in food for 8 mos.	P.O.	0	8 alive at 10 mos.	10 mos.
1013.--2'-METHYL-4-DIMETHYLAMINOAZOBENZENE 								
Miller and Baumann, 1945	10 rats	Albino	---	0.064% in food for 6 mos.	P.O.	4[3]	9 alive at 8 mos.	8 mos.
1014.--3'-METHYL-4-DIMETHYLAMINOAZOBENZENE 								
Giese et al., 1945	98 rats	Albino	---	0.048-0.064% in diets, 2½-3 mos.	P.O.	67[3]	96 alive at 2½-3 mos.	5 mos.
Miller and Baumann, 1945	10 rats	--do--	---	0.064% in food for 3 mos.	P.O.	7[3]	8 alive at 4 mos.	4 mos.
Cortell, 1947	30 rats	Sprague-Dawley	M	0.05% in corn oil for 69 days	P.O.	Tumors[4]	---	At least 190 days
1015.--4'-METHYL-4-DIMETHYLAMINOAZOBENZENE 								
Nagao, 1940b	31 rats	---	M & F	0.03-0.02% in food	P.O.	11[5]	14 alive at 210 days	402 days
Sasaki et al., 1940a	31 rats	---	--do--	--do--	--do--	--do--	--do--	--do--
Nagao, 1941b	--do--	---	--do--	--do--	--do--	12[6]	16 died in 200 days	402 days
Miller and Baumann, 1945	10 rats	Albino	---	0.064% in food for 8 mos.	--do--	1[3]	All alive at 10 mos.	10 mos.

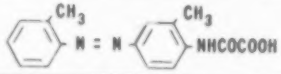
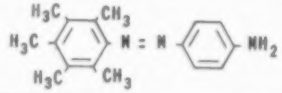
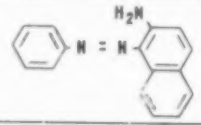
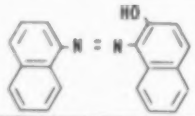
1. Changes in kidney described.
2. Citing unpublished work of Yoshida.
3. Hepatic.
4. Bile duct cholangioma and cystadenoma; liver-cell carcinoma.
5. Hepatomas in animals alive at 210 days. Also epithelioma of bile duct. Metastases to spleen, greater omentum, mesenteric lymph nodes, lungs and kidneys.
6. Liver carcinoma, appearing after 200 days; metastases in 3 animals.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1016.--2-METHYL-4-DIMETHYLAMINOAZOBENZENE HYDROCHLORIDE 								
Nagao, 1941c	36 rats	White	---	0.4-2.5% in diet	P.O.	Tumors[1]	---	At least 352 days
1017.--N-METHYL-N-ETHYL-p-AMINOAZOBENZENE 								
Sugiura, 1947	Rats	---	---	0.06% in cottonseed oil	P.O.	Tumors[2]	---	250 days
1018.--N-METHYL-2'-METHYL-p-AMINOAZOBENZENE 								
Sugiura, 1947	Rats	---	---	0.06% in cottonseed oil	P.O.	Tumors[2]	---	250 days
1019.--N-METHYL-3'-METHYL-p-AMINOAZOBENZENE 								
Sugiura, 1947	Rats	---	---	0.06% in cottonseed oil	P.O.	Tumors[2]	---	250 days
1020.--N-METHYL-4'-METHYL-p-AMINOAZOBENZENE 								
Sugiura, 1947	Rats	---	---	0.06% in cottonseed oil	P.O.	Tumors[2]	---	250 days
1021.--METHYL ORANGE 								
Kinosita, 1936a	Rats	White	---	In olive oil	P.O.	0	---	At least 400 days
Kinosita, 1937	Rats (?)	White	---	In aqueous soln.	S.C.	0	---	---
	Rats	---	---	---	P.O.	0	---	---
Tanaka, 1937[3]	Rats	---	---	---	S.C.	0	---	---
Korosteleva, 1940b	Rats	---	---	---	P.O.	0	---	---
1022.--METHYL RED 								
Kinosita, 1936a	Rats	White	---	In olive oil	P.O.	Tumors[4]	---	---
Kinosita, 1937	Rats	---	---	---	P.O.	0	---	---
Korosteleva, 1940b	Rat	---	---	---	P.O.	0[5]	---	---

1. Of the liver, beginning at about 200 days; epithelioma of the bile duct, and hepatomas.
2. Cholangiomas and hepatomas.
3. Cited by Maruya, 1937.
4. Of the liver; also many bladder papillomas.
5. Non-tumorous growth of tissues in the liver.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1023.--NAPHTHALENE FAST ORANGE 2GS 								
Cook et al., 1940a	20 mice	---	---	In aq. soln. 15-20 mg. weekly	P.O.	0[1]	---	538 days
1024.--NAPHTHION RED 								
Weyl, 1892	1 dog	---	---	0.82 g. in aq. soln. daily	P.O.	0	---	1 mo.
1025.--NAPHTHOL BLACK P 								
Weyl, 1892	1 dog	---	---	1 g. daily	P.O.	0	---	1 mo.
1026.--m-NITROPHENYLAZO-β-NAPHTHOL 								
Weyl, 1892	1 dog	---	---	1 g., 10 times in 20 days	P.O.	0	---	5 weeks
1027.--ORANGE II 								
Weyl, 1892	1 dog	--	---	2.5 g. (total dose) in aq. soln. during 10 days	S.C.	0	---	At least 45 days
Cook et al., 1940a	30 mice	--	---	In aq. soln. 15-20 mg. weekly	P.O.	0[2]	---	538 days
1028.--OXALYL-o-AMINOAZOTOLUENE[3] 								
Nagao, 1938	20 rats	White	---	0.3% in food	P.O.	1[4]	16 died in 3 mos.	167 days
	15 rats	---	---	0.1% in food	P.O.	0[5]	Several killed early	Over 300 days

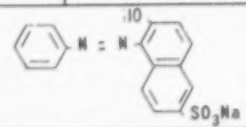
1. No liver lesions in 2 livers examined.
2. No liver lesions in 6 livers examined.
3. Called N,N' oxalyl- in paper.
4. Papillomatous hepatoma. Also in 3 animals strongly adenomatous epithelial bile duct cells and vigorous proliferation of hepatic cells.
5. Slight proliferation of epithelial bile duct cells.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1028.--OXALYL-o-AMINOAZOTOLUENE[1] (Continued) 								
Nagao, 1940b	Rats	---	---	0.5% in food	P.O.	Tumors[2]	---	167 days
	--do--	---	---	0.2% in food	--do--	--do--	---	335 days
	--do--	---	---	0.1% in food	--do--	--do--	---	457 days
1029.--2',3',4',5',6'-PENTAMETHYL-4-AMINOAZOBENZENE 								
Sugiura, 1945	12 rats	Sherman	---	7.9 mg. daily in food	P.O.	0	---	286 days
1030.--PHENYLAZO-2-NAPHTHYLAMINE 								
Salant and Bergis, 1916	Rabbits	---	---	Ca 60-70 mg. per kg. body weight daily in food	P.O.	0	---	4½ mos.
	2 rabbits	---	M	1 g. per kg. body weight susp. in gelatin	S.C.	0	1 died in 8 days	37 days
Badger et al., 1942	10 mice	C3H	---	0.3% in benzene twice weekly	Skin	0	9 alive at 6 mos., 4 alive at 1 year	464 days
	--do--	--do--	---	5 mg. in glycerol, repeated inj.	S.C.	0	7 alive at 6 mos., 1 alive at 1 year	401 days
	20 mice	--do--	---	In food	P.O.	0	16 alive at 6 mos., 2 alive at 1 year	403 days
Sugiura, 1946	42 rats	Sherman	M & F	1 microgram to 12 mg. daily	P.O.	0	32 died in 150 days	Ca. 500 days
	--do--	--do--	--do--	--do--	--do--	0	20 died in 70 days	--do--
	22 rats	--do--	--do--	--do--	--do--	0	8 died in 150 days	--do--
1031.--PIGMENT BORDEAUX N 								
Maruya, 1937	Rats	White	---	In food	P.O.	0[3]	---	At least 200 days
Maruya, 1938	11 rats	--do--	M & F	0.04% in food	--do--	0[4]	---	327 days

1. Called N,N' oxalyl- in paper.
2. Of the liver, mostly hepatomas. In some cases cornified papillomas of the bladder; in many cases annular cirrhosis of the liver.
3. Changes in liver and kidneys.
4. Changes in kidney described.

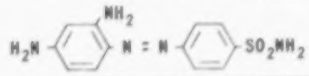
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

1032.--PONCEAU 4GB



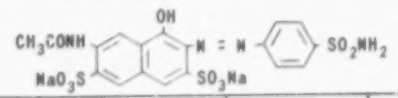
Meyl, 1892	1 dog	---	---	1 g. daily	P.O.[1]	0	---	1 mo.

1033.--PRONTOSIL



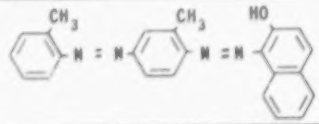
Gambino, 1940	1 guinea pig	---	M	0.43 cc., 2.5% daily	I.M.	2	---	40 days
	--do--	---	M	0.65 cc. daily	--do--	0	---	--do--

1034.--PRONTOSIL SOLUBLE



Zamecnik and Koletsky, 1939	19 mice	dba	M	40 to 60 mg. in aqueous soln. every 2 or 3 weeks for 4½ mos.	S.C.	0	12 alive at 9 mos., 8 alive at 1 year	1 year

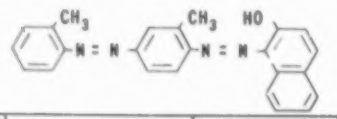
1035.--SCARLET RED



Fischer, 1906	Rabbits	---	---	Saturated soln. in olive oil	S.C.	0[2]	---	---
	--do--	---	---	--do--	Skin	0	---	1 mo.
	--do--	---	---	--do--	I.V.	0[3]	---	---
Helmholz, 1907a	1 rabbit	---	F	Saturated soln. in olive oil- paraffin	Under rectal mucosa	0	---	Nearly 3 mos.
Jores, 1907	Rabbit	---	---	In paraffin	S.C., ear	0[4]	---	---
	Dog	---	---	--do--	S.C.	0[5]	---	---
Snow, 1907	6 rabbits	---	---	Saturated soln. in olive oil	S.C., ear	0	---	7-61 days
Schreiber and Wengler, 1908	Rabbits	---	---	Saturated soln. in olive oil	Anterior chamber of eye	0[6]	---	120 days
Wessely, 1908	Rabbits	---	---	--do--	Eye[7]	0	---	---
Fricke, 1909	Dogs	---	F	Saturated soln. in olive oil, 1 cc.	S.C., ear	1	---	38 days
Meyer, 1909	6 dogs	---	---	Saturated soln. in olive oil	Into kidney or renal artery	0	---	34 days
	6 rabbits	---	---	--do--	S.C., ear	0[8]	---	32 days
	--do--	---	---	--do--	S.C., tongue	0	---	30 days

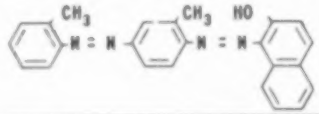
1. By stomach tube.
2. Growths obtained similar to carcinoma.
3. Small lung nodules obtained.
4. Epithelial proliferation observed.
5. Slight epithelial proliferation observed.
6. Rapid cell proliferation.
7. Subconjunctival tissue.
8. Atypical proliferation observed.

1035.--SCARLET RED (Continued)

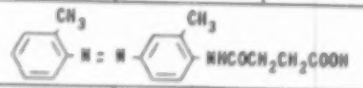
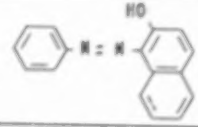
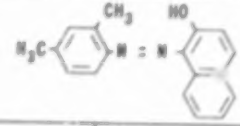
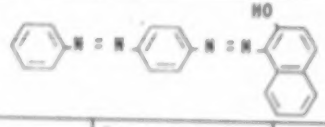


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Huguenin, 1910	6 rabbits	---	---	Saturated soln. in olive oil	S.C., ear	6[1]	---	---
Rutschinski, 1910a	Rabbits	---	---	Saturated soln. in olive oil, mostly single inj.	Under capsule of kidney or S.C., ear	0	---	14 to 65 days
Benthin, 1911	Rabbits	---	---	In olive oil or rabbit fat	I.M., ear	0[2]	---	Ca. 1 year
Haga, 1913	9 rabbits	---	---	Saturated soln. in olive oil	S.C., ear[3]	0	---	2 mos.
Bullock and Rohdenburg, 1918	Rats	---	---	Soln. in olive oil in mice Soln. in olive oil or ether Sponge impregnated with dye	Stomach wall Stomach Inj. into stomach	Tumors[4]	---	---
	Rats	---	---	Soln. in olive oil or ether inj.	Tongue, parotid sub-maxillary gland	0[5]	---	---
	108 rabbits	---	---	In olive oil, repeated inj.	S.C.	0[6]	---	At least 4 mos.
Takeuchi, 1918	90 mice	---	M & F	Saturated soln. in olive oil weekly with intervals or every 2 weeks	S.C.	0[7]	---	86 weeks
Yamagiwa and Ohno, 1918a	41 fowls[8]	---	F	Saturated soln. in olive oil, repeated inj.	Oviduct wall	3[9]	---	---
Yamagiwa and Ohno, 1918b	29 fowls	---	F	--do--	Inj.	2 carc.[10]	---	---
Akamatsu, 1920	4 fowls	---	M & F	5% in lanolin	P.O.	0	---	79 to 270 days
Buschke and Langer, 1923	Rats	---	---	Saturated soln. in olive oil, 1-2 times weekly	Rectum	0	---	5-8 mos.
Schmidt, 1924	Mice	---	---	In food[11]	P.O.	1[12]	---	13 mos.
Bauer, 1926	Rabbits	---	---	---	Bladder	Pap.	---	At least 6 weeks
Young, 1928	Rabbits	---	---	In olive oil	Pleural sac	0	---	---
Büngeler, 1930	40 mice	---	---	Saturated soln. in mineral oil	S.C., mammary gland	0	---	Ca. 17 mos.
	Rabbits	---	---	--do--	S.C., ear	1 carc.[13]	---	Ca. 28 mos.

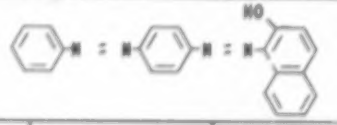
1. Penetration of pavement epithelium recalling carcinoma; transplants unsuccessful.
2. Epithelial proliferation observed.
3. Other ear injected with Sudan III in oil.
4. Localized papillary tumors.
5. Metaplasia and lesions resembling benign epitheliomas.
6. One epithelioma, probably benign.
7. Atypical epithelial proliferation; in 3 males, cystadenomatous picture.
8. In 12 animals the tube was ligated.
9. Adenocarcomas; metastases to spleen and ovary.
10. One with metastases.
11. With or without the addition of cholesterol, lecithin or cephalin.
12. Liver adenoma.
13. This animal had also received a long-continued feeding of arsenic.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1035.--SCARLET RED (Continued) 								
Abb, 1952	3 rabbits	---	---	1 cc. twice weekly, then every 2 weeks[1]	Parotids	3	---	159 days
	5 rats	---	---	0.2 cc. twice weekly, then every 2 weeks[2]	--do--	5	---	113 days
Yoshida, 1932c	Guinea pigs	---	---	Suspension in gum arabic soln.	S.C.	0	---	---
Korteweg, 1932	29 mice	---	---	---	P.O.	0[3]	13 alive at 15 mos.	22 mos.
Kinosita, 1937	Several species	---	---	In olive oil	Direct application	0	---	---
	--do--	---	---	--do--	I.V.	0	---	---
	--do--	---	---	In food	P.O.	0	---	---
	--do--	---	---	In cholesterol	Direct application	0	---	---
Maruyb, 1937	Rats	White	---	In food	P.O.	0[4]	---	At least 200 days
Rinole[5]	Fowls	---	F	Repeated direct application	Fallopian tube	0[6]	---	At least 234 days
Cestari, 1938	2 rabbits	---	---	0.7% aqueous colloidal soln., 5 and 10 cc. respectively every 2 days	I.V.	0[7]	---	1 mo.
Kinosita, 1938a	Rats	---	---	In food	P.O.	0[8]	---	---
Maruya, 1938	13 rats	White	M & F	0.04% in food	P.O.	0[9]	---	321 days
Rika[10]	Fowls	---	F	---	Oviduct	0[11]	---	2 years
Korosteleva, 1940b	Rat	---	---	---	P.O.	Tumors[12]	---	---
	Rabbit	---	---	---	S.C.	Tumors[13]	---	---
	Fowl	---	M	---	S.C.	Tumors[14]	---	---
Shear and Stewart, 1941	10 mice	A	---	Saturated soln. in lard, repeated inj.	S.C.	0	---	25 mos.
	4 mice	M	---	Ca 5 mg. crystals, repeated inj.	S.C.	0	6 alive at 18 mos.	
	6 mice	Stock	F	--do--	S.C.	1 sarc.		
Paletta et al., 1941	45 mice[15]	Stock	---	Saturated soln. in olive oil daily	Skin	0	---	150 days
Peredelsky, 1941	8 axolotls	---	---	2.5 mg. per cc. of coagulated egg albumin or paraffin oil	S.C.	1[16]	---	103 days

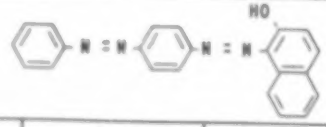
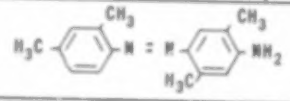
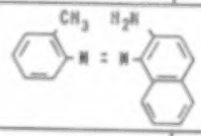
1. Plus weekly tar paintings on the back.
2. 3 of the animals also received weekly tar paintings on the back.
3. Liver cirrhosis.
4. Changes in liver and kidneys.
5. Unpublished results cited by Kinosita, 1937.
6. Occasional epithelial proliferation at site and of the follicular epithelium of the thyroid.
7. Pathological changes in liver.
8. In some cases proliferation of the hepatic bile duct epithelium.
9. Changes in kidney described.
10. Unpublished results cited by Kinosita, 1938a.
11. One granuloma.
12. Adenomatous growth of epithelium of the gall bladder.
13. Atypical proliferation of epithelium of the skin.
14. Carcinomas, papillomatous-like.
15. Including 25 mice with skin traumatized every 10 days for 50 days at site of application.
16. Also 2 tumors out of 7 axolotls with egg albumin alone, and no tumors in 6 with paraffin oil alone.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1036.--4'-SUCCINOYLAMINO-2,3'-DIMETHYLAZOBENZENE 								
Negso and Hashimoto, 1959	26 rats	White	---	0.15-0.45% in food	P.O.	4[1]	12 alive at 200 days	400 days
1037.--SUDAN I 								
Kinosita, 1957	Several species	---	---	In olive oil	Direct application			
	--do--	---	---	--do--	I.V.	0	---	---
	--do--	---	---	In food	P.O.			
	--do--	---	---	In cholesterol	Direct application			
Maruya, 1957	Rats	White	---	In food	P.O.	0[2]	---	At least 200 days
Maruya, 1958	10 rats	---	M & F	0.02% in food	P.O.	0[3]	---	343 days
1038.--SUDAN II 								
Kinosita, 1957	Several species	---	---	In olive oil	Direct application			
	--do--	---	---	--do--	I.V.	0	---	---
	--do--	---	---	In food	P.O.			
	--do--	---	---	In cholesterol	Direct application			
Maruya, 1957	Rats	White	---	In food	P.O.	0[2]	---	At least 200 days
Maruya, 1958	12 rats	---	M & F	0.04% in food	P.O.	0[3]	---	336 days
1039.--SUDAN III 								
Fischer, 1906	Rabbit	---	---	Saturated soln. in olive oil	Ear	0[4]	---	---
Helmholz, 1907a	2 rabbits	---	---	Saturated soln. in olive oil weekly	S.C.	0[5]	---	2 mos.
	1 rabbit	---	---	Saturated soln. in olive oil- paraffin	Bladder lining	1 pap.	---	12 days
	2 rabbits	---	---	Saturated soln. in olive oil	Under rectal mucosa	0	---	22 days

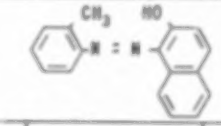
1. 2 hepatomas and 2 liver adenomas, all over 180 days.
2. Changes in liver and kidneys.
3. Changes in kidney described.
4. Epithelial proliferation.
5. Atypical proliferation.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1039.--SUDAN III (Continued) 								
Helmholz, 1907b	2 rabbits	---	---	Saturated soln. in olive oil, repeated inj.	Ear	0[1]	---	---
McConnell, 1907	2 rabbits	---	---	Saturated soln. in olive oil	S.C., ear	0	---	2 and 6 mos.
	1 rat	White	---	--do--	--do--	0	---	2 mos.
	1 guinea pig	---	---	--do--	--do--	0	---	--do--
Stahr, 1907	2 rabbits	---	F	Saturated soln. in olive oil	S.C., ear	0[2]	---	---
	Mice	White	---	--do--	I.P.	0[3]	---	---
Rutschinski, 1910a	Rabbits	---	---	Saturated soln. in olive oil, chiefly 1 inj.	Under capsule of kidney or S.C., ear	0	---	65 days
	3 rabbits	---	---	Saturated soln. in olive oil, repeated inj.	S.C., ear[4]	1 epi.[5]	---	68 days
Benthin, 1911	Rabbits	---	---	In olive oil or rabbit fat	I.M., ear	0[6]	---	At least 8 weeks
Haga, 1913	9 rabbits	---	---	--do--	S.C., ear[7]	0	---	2 mos.
Akamatsu, 1920	2 fowls	---	M & F	5% in lanolin	P.O.	0	---	67 and 143 days
Schmidt, 1924[8]	Mice	---	---	In food[9]	P.O.	1 sarc.[10]	---	92 days to 13 mos.
Hellmich, 1928	1 salamander[11]	---	---	In oil	S.C.	0[12]	---	---
	3 newts[13]	---	---	--do--	S.C.	1[14]	---	At least 1.5 mos.
	Frogs	---	---	--do--	S.C.	2 carc.	---	---
Young, 1928	16 rabbits	---	---	Ca. 0.9 gm. in olive oil emulsion[15]	Pleural sac	0[16]	10 died or killed in 16 days	47 days
Kinosita, 1937	Several species	---	---	In olive oil	Direct application			
	--do--	---	---	--do--	I.V.			
	--do--	---	---	In food	P.O.	0	---	---
	--do--	---	---	In cholesterol	Direct application			

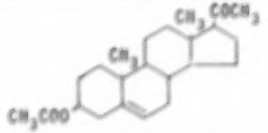
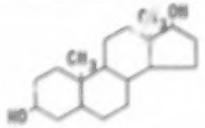
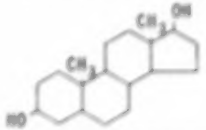
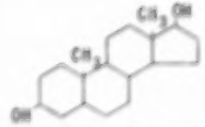
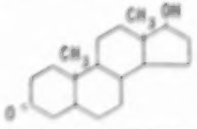
1. Connective tissue proliferation; one chondroma.
2. Atypical proliferation.
3. Small nodules observed.
4. Ears previously injured with mallet blows.
5. Nodules in S.C. tissue; epithelial proliferation.
6. Epithelial proliferation.
7. Other ear injected with scarlet red in olive oil.
8. The substance used is called "Sudan", but Sudan III is probably implied.
9. With or without the addition of cholesterol, lecithin or cephalin.
10. Of the neck.
11. *Ambystoma tigrinum.*
12. Nodules which disappeared.
13. *Triton cristatus.*
14. A "preblastomatous" process in 1.5 months.
15. Emulsified with an aqueous sodium tauroglycocholate solution.
16. Varied metaplasia and hyperplasia of the pulmonary epithelium; without a bile salt negative results were obtained.

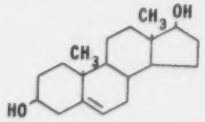
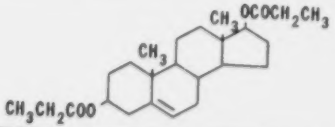
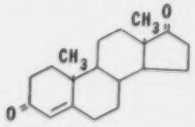
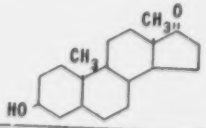
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1039.--SUDAN III (Continued) 								
Maruya, 1957	Rats	White	---	In food	P.O.	0[1]	---	At least 200 days
Maruya, 1958	15 rats	--do--	M & F	0.04% in food	P.O.	0[2]	---	328 days
Shear and Stewart, 1941	10 mice	Stock	F	Saturated soln. in lard, 0.25 cc. repeated injections	S.C.	0	---	24 mos.
	--do--	A	---	--do--	S.C.	0	---	--do--
	--do--	Stock	F	Ca. 5 mg. crystals, repeated injections	S.C.	0	---	--do--
1040.--p-SULFAMIDOPHENYLAZOSALICYLIC ACID LITHIUM SALT								
Berge and Barret, 1940	6 rabbits	---	M & F	5% aq. soln. 4 or 5 cc. every 2 or 4 days	I.V.	0	---	Ca. 1 mo.
1041.--2,5,2',5'-TETRAMETHYL-4-AMINOAZOBENZENE 								
Kinosita, 1956a	Rats	White	---	In olive oil	P.O.	0	---	At least 400 days
1042.--TETRAMETHYL-p,p'-DIAMINOAZOXYBENZENE								
Kinosita, 1958c	Rats (?)	---	---	In food	P.O.	0[3]	---	---
1043.--1-o-TOLYLAZO-2-NAPHTHYLAMINE 								
Salant and Bengis, 1916	Rabbits	---	---	Ca. 120--140 mg. per kg. body wt. daily in food	P.O.	0	---	4½ mos.
Kinosita, 1958a	Rats	---	---	In food	P.O.	0	---	---
Badger et al., 1942	10 mice	C3H	---	0.3% in benzene twice weekly	Skin	0	9 alive at 6 mos., 5 alive at 1 year	399 days
	--do--	--do--	---	5 mg. in glycerol, repeated injections	S.C.	0	5 alive at 6 mos.	314 days
	20 mice	--do--	---	In food	P.O.	0[4]	13 alive at 6 mos., 5 alive at 1 year	491 days
Sugiura, 1942	31 rats	Sherman	---	0.12% in food	P.O.	0	8 alive at 259 days	259 days

1. Changes in liver and kidneys.
2. Changes in kidney described.
3. Proliferation of hepatic cells.
4. One stomach papilloma within 341 days.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1046.--o-TOLYLAZO-β-NAPHTHOL[1] 								
Kinosita, 1940b	Rats	---	---	In food	P.O.	0	---	---

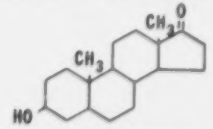
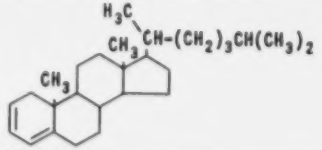
1. Called in the paper "2-methylbenzene-1-azo-2-oxynaphthalene."

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1045.--ACETOXYPREGNENOLONE 								
Bruzzone et al., 1961	21 guinea pigs	---	M & F	250-1250 micrograms absorbed per day	Implanted	0	---	Ca. 152 days
1046.--cis-ANDROSTANEDIOL 								
Suntzeff and Kinsey, 1964	5 guinea pigs	---	M	2 mg. in sesame oil daily	Inj.	0	---	28 days
1047.--ANDROSTANEDIOL-3α,17α 								
Buchanan, 1965	14 mice	Murray-Little mice	M	1-4 pellets 2.5-5.0 mgm. per 30 days absorbed	Implanted	0	---	60 days
1048.--ANDROSTANEDIOL-3β,17α 								
Buchanan, 1965	6 mice	Murray-Little mice	---	4 pellets 2.5 mgm. per 30 days absorbed	Implanted	0	---	60 days
1049.--ANDROSTANOL-17α-one-3 								
Buchanan, 1965	11 mice	Murray-Little mice	---	1-5 pellets 0.625-3.13 mgm. per 30 days absorbed	Implanted	0	---	60 days

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1050.-- Δ^5-trans-ANDROSTENEDIOL 								
Bottomley and Folley, 1938	5 guinea pigs	---	M	2 mg. in sesame oil	Inj.	0	---	28 days
	--do--	---	M, castr.	--do--	--do--	0	---	--do--
van Wagenen and Folley, 1939	1 monkey	Rhesus	F, castr.	0.45 gm. (total dose) in olive oil	--do--	0	---	60 days
1051.--ANDROSTENEDIOL DIPROPIONATE 								
Lacassagne, 1939b	3 mice	R III	M	In olive oil	S.C.	2 sarc.	---	638 days
	2 mice	39	F	--do--	S.C.	0	---	590 days
1052.-- Δ^4-ANDROSTENEDIONE-3,17 								
Bottomley and Folley, 1938	5 guinea pigs	---	M	2 mg. in sesame oil, daily	Inj.	0	---	32 days
Kochakian, 1945	2 mice	Murray-Little dba	---	2 pellets 19.70 mgm. per 30 days absorbed	Implanted	0	---	60 days
1053.--ANDROSTERONE 								
Bottomley and Folley, 1938	9 guinea pigs	---	M	2 mg.[1] in sesame oil daily	Inj.	0	---	31 days
Korenchevsky and Hall, 1938	Rats	---	M & F	7.5 mg. weekly	Inj.	0	---	2.5 to 4 mos.
Korenchevsky and Hall, 1939	4 rats[2]	---	M	7.5 mg. in sesame oil, 5 times weekly	Inj.	0	---	90 to 118 days
	4 rats	---	M	--do--	--do--	0	---	--do--
Korenchevsky et al., 1939b	4 rats	---	F, castr.	1.5 mg. in sesame oil, 5 times weekly	Inj.	0	---	--do--

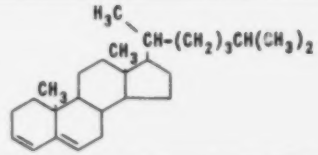
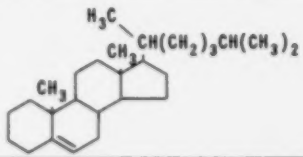
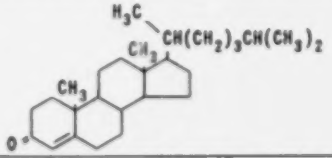
1. Called cis-5-androsterone.

2. Senile, 3 with pneumonia.

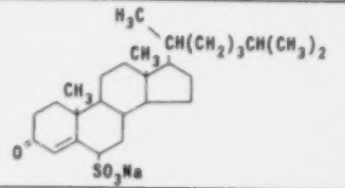
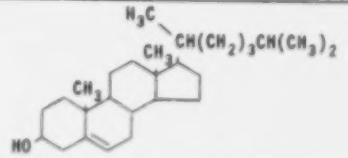
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1053.--ANDROSTERONE (Continued) 								
Korenchevsky et al., 1939c	4 rats	---	M, castr.	1.5 mg. in sesame oil, 5 times weekly	Inj.	0	---	Ca. 105 days
Van Wagenen and Folley, 1939	1 monkey	Rhesus	F, castr.	1.35 gm. (total dose) in olive oil	Inj.	0	---	60 days
Korenchevsky and Hall, 1940	4 rats	---	F, castr.	7.5 mg. weekly	Inj.	0	---	53-146 days
Korenchevsky, 1941	Rats	---	F, castr.	--do--	Inj.	0	---	Ca. 3½ mos.
Forbes, 1942	15 rats	---	M & F	Pellets	S.C.	0	---	At least 120 days
1054.--BUFAGIN[1]								
Smith and Gardner, 1939	4 mice	---	M	1% in sesame oil, 0.1 cc. twice weekly, 10 injections	S.C.	0	1 alive at 100 days	665 days
1055.--BUFOTALIN[1]								
Smith and Gardner, 1939	8 mice	---	M	1% in sesame oil, 0.1 cc. twice weekly, 10 injections	S.C.	0	2 alive at 100 days	448 days
1056.--BUFOTOXIN[1]								
Smith and Gardner, 1939	1 mouse	---	M	1% in sesame oil, 0.1 cc. twice weekly, 10 injections	S.C.	0	---	480 days
1057.--$\Delta^{2,4}$-CHOLESTADIENE 								
Butenandt and Kudzuss, 1938	20 mice	---	---	0.5%[2] in benzene twice weekly	Skin	0	---	6 weeks
Shau and Bergman, 1938	20 mice	CBA	---	1% in sesame oil, 0.2 cc. weekly	S.C.	0	---	12 mos.

1. For a discussion of structure see Fieser and Fieser, 1949.

2. M.P. 61°.

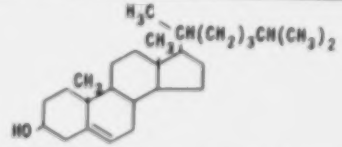
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1058.--$\Delta^{3,5}$-CHOLESTADIENE 								
Waterman[1]	Mice	---	---	In food	P.O.	4 pap.[2]	---	1 year
Waterman, 1940	Mice	---	---	In coconut oil	P.O.	Tumors[3]	---	---
Kirby, 1943	Rats	Alstar	---	In food	P.O.	0	---	18 mos.
Kirby, 1944a	24 rats	--do--	---	25 mg. in food, daily	P.O.	0	6 alive at 600 days	689 days
Larsen and Barrett, 1944	30 rats	Alstar	M & F	14-15 mg.[4] pellets	S.C.	0	10 died or killed in 12 mos.	16 mos.
	40 mice	C3H	M	11-12 mg. pellets	S.C.	0	11 died or killed in 12 mos.	15 mos.
	30 rats	Alstar	M	0.065-6.5% in food	P.O.	0	---	--do--
1059.--$\Delta^{2,4}$-CHOLESTADIENE PEROXIDE[5] $C_{27}H_{44}O_2$								
Butenandt and Kudzuss, 1938	20 mice	---	---	0.5%[6] in benzene twice weekly	Skin	0	---	6 weeks
1060.--CHOLESTENE 								
Barry et al., 1935	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	14 alive at 6 mos., 7 alive at 1 year	587 days
1061.--CHOLESTENONE 								
Bishoff and Rupp, 1946	34 mice	Marsh & New Buffalo	F	19 mgm. in sesame oil[7]	S.C.	Tumors[8]	---	At least 6 mos.

1. Unpublished results cited by Veldstra, 1939.
2. Of the stomach; one showed infiltrating properties.
3. Of the stomach.
4. M.P. 79-80°.
5. For evidence that this may not be a peroxide see Skau and Bergman, 1938.
6. M.P. 167°.
7. M.P. 79-81°.
8. Mammary gland and lymphoid; fibrosarcomas.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1062.--CHOLESTENONE-6-SULFONIC ACID, Sodium Salt 								
Harel and Gumsel, 1959	50 rats	---	---	12.5 mg. (as free acid) in water, daily	P.O.	0	---	52 weeks
1063.--CHOLESTEROL 								
Anitschkow and Chalatow, 1913	Rabbits	---	---	0.5-0.8 g. in food, daily	P.O.	0	---	4-8 weeks
Anitschkow, 1913a	Rabbits	---	---	In food	P.O.	0	---	4 mos.
Anitschkow, 1913b	8 rabbits	---	---	0.2-0.8 g. daily	P.O.	0	---	139 days
Wacker and Hueck, 1913	Cats	---	---	0.5 g. daily in food	P.O.	0	---	32 days
	Dogs	---	---	1 gm. daily in food	P.O.	0	---	35 days
	---do---	---	---	---do---	---do---	0	---	57-203 days
	---do---	---	---	9.75 gm. (total dose) in oil	S.C.	0	---	94 days
Anitschkow, 1914	5 rabbits	---	---	14.2 to 159 gm. (total dose) in sunflower seed oil	P.O.	0	---	26-139 days
Bailey, 1914	Rabbits	---	---	0.2-0.5 gm. daily in food	P.O.	0	---	37 days
Chalatow, 1914	8 rabbits	---	---	0.2-0.8 g. in sunflower-seed oil daily	P.O.	0[1]	---	4.5 mos.
Bailey, 1915	4 guinea pigs	---	---	0.1-0.5 g. in food daily	P.O.	0	---	72 days
Corper, 1915	19 guinea pigs	---	---	0.1 gm.	S.C.	0	---	15 days to 27 mos.
Robertson, 1916a	69 mice	---	M & F	Ca. 42 mg. in food daily	P.O.	0	---	55 weeks
Takahashi, 1926	4 rats	White	M & F	0.7% in food[2]	P.O.	0	---	70-220 days
Alessandri, 1935	Mice	---	---	0.05 g. in milk daily	P.O.	0[3]	---	164 days
Pollettini, 1938	20 rats	White	---	1% in olive oil	S.C., back	0	---	20 mos.
Burrows and Maynecord, 1937	9 mice	Stock	---	5% in lard, 2.5 cc.	S.C.	0	---	630 days

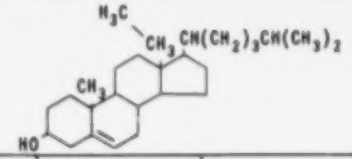
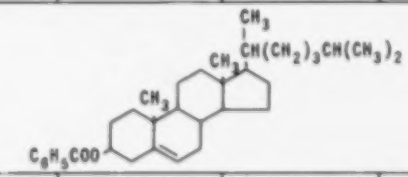
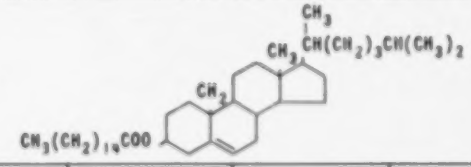
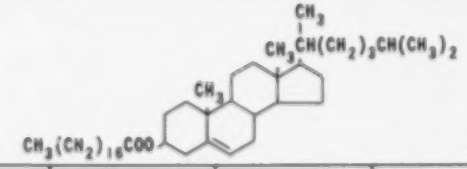
1. Fatty infiltration of the liver and cirrhotic changes.
2. M.P. 145°.
3. Nodules in lungs, kidneys and liver.

1063.--CHOLESTEROL (Continued)

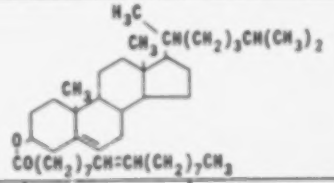
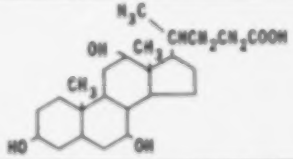
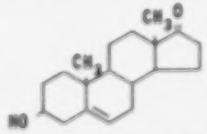


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Roffo, 1938	100 rats	White	---	0.1 gm. daily (?) in food	P.O.	0[1]	---	2 yrs., 4 mos.
Weil, 1938	2 rats	White stock	---	---	Brain	0	---	210 days
Roffo, 1939	Rats	---	---	---	P.O.	Tumors[2]	---	---
Gardner et al., 1940	10 mice	C3H	---	0.5 mg. in sesame oil weekly	S.C.	0	All alive at 150 days	618 days
Shear and Ilfeld, 1940	50 mice	D	---	7-60 mg. as pellets	S.C.	0	13 alive at 11 mos.	11 mos.
Wentworth et al., 1940	5 mice	---	M & F	20-22.5 mg. itot. dose in sesame oil	S.C.	0	---	Prolonged period
Franseen et al., 1941a	2 rats	Stonsker	---	Pellet	Upper tibial epiphysis	0	---	---
Lorenz et al., 1941	20 mice	A	---	0.028(?) dispersion in Aerosol O.T. soln. 0.5 cc.	I.V.	5[3]	10 killed at 20 weeks	46 weeks
Selye and Friedman, 1941	6 mice	dba	---	5 mg. in peanut oil daily	Inj.	0	---	40 days
Shimkin and White, 1941	6 mice	A and C3H	M	Pellets, 3.9 mg.[4]	S.C.	0	---	70 days
Forbes, 1942	15 rats	---	M & F	Pellets	S.C.	0	---	143 days
Steiner, 1942a	Mice and guinea pigs	---	---	---	Salivary gland	0	---	---
Steiner, 1942b	21 mice	---	F	2.5 mg. pellet	Sub-maxillary	0	5 alive at 17 mos.	Over 24 mos.
	5 guinea pigs	---	---	20 mg. pellet	Salivary gland	0	---	28 days
Selye, 1944	10 rats	M	---	50 micrograms in peanut oil daily	S.C.	0	---	14 mos.
Beck, S. et al., 1945	18 mice	Stock	---	100 mg.[5] in arachis oil	S.C.	0[6]	---	At least 700 days
	--do--	--do--	---	in acetone	Skin	3 pap.	---	--do--
Kirby, 1945a	12 rats	Wistar	---	25 mgm. daily[5]	P.O.	0	---	At least 467 days

1. All but 2 had small ulcerative cancer-like lesions of the digestive tract.
2. Carcinoma of the stomach; sarcoma of the liver.
3. Of the lung in the 10 alive after 20 weeks.
4. M.P. 149-150°.
5. Heated to 430° C.
6. Squamous carcinoma of the anus in one.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1063.--CHOLESTEROL (Continued) 								
Kochakian, 1945	8 mice	Murray-Little dba	Castr.	1 or 2 pellets (none absorbed)	Implant	0	---	60 days
Pizzolato, 1945	20 rats	---	---	10-100 mg., repeated inj.[1]	I.P.	1 sarc.	---	18 mos.
Bischoff and Rupp, 1946	35 mice	Marsh-Buffalo	F	20 mgm. (total) for 6 mos. in sesame oil	S.C.	0	---	At least 6 mos.
Popják, 1946	Rabbits	---	---	0.5-1.0 g. in water	P.O.[2]	0	---	1 mo.
	4 rabbits	---	---	1.0 g. daily	P.O.	0	---	12 weeks
Truhaut, 1947	40 mice	---	M & F	0.20 g. in 1 cc. of olive oil	S.C.	0	---	At least 315 days
1064.--CHOLESTEROL BENZOATE 								
Gardner et al., 1948	12 mice	C3H	---	0.5 mg. in sesame oil weekly	S.C.	0	All alive at 450 days	646 days
1065.--CHOLESTEROL PALMITATE 								
Kirby, 1945a	12 rats	Wistar	---	25 mgm. daily[3]	P.O.	0	---	At least 15 mos.
1066.--CHOLESTEROL STEARATE 								
Kirby, 1945a	12 rats	Wistar	---	25 mgm. daily[3]	P.O.	0	---	At least 15 mos.

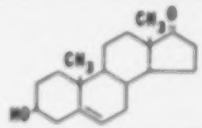
1. 75 other rats, receiving irradiated cholesterol, produced one fibrosarcoma.
2. By stomach tube.
3. Heated to 300° C.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1067.--CHOLESTERYL OLEATE 								
Waterman, 1936	6 mice	---	---	3 times weekly[1]	P.O.	1[2]	---	318-441 days
Waterman, 1937b	--do--	---	---	3 times weekly	P.O.	3[3]	---	441 days
1068.--CHOLIC ACID 								
Loeffler, 1928	Rabbits	---	---	0.1 gm. daily in food	P.O.	0	---	90-120 days
Loeffler, 1930	Mice	---	---	Not over 20 mg. daily in food	P.O.	0	---	4 to 84 days
Law, 1941d	30 mice	A	M & F	10 mg. in olive oil (total dose)	S.C.	0	---	6 mos.
	Mice	C3H, C57 bl, and AB	---	--do--	--do--	0	---	10 mos.
Shear et al., 1941a	14 mice	A	M	10 mg. crystals, 8 inj.	S.C.	0	13 alive at 10 mos., 5 alive at 20 mos.	20 mos.
1069.--CINOBUFAGIN[4]								
Smith and Gardner, 1939	2 mice	---	M	1% in sesame oil, 0.1 cc. weekly, 10 inj.	S.C.	0	All dead in 100 days	100 days
1,2-CYCLOPENTENOPHENANTHRENE[5]								
1070.--CYMARIN[4]								
Smith and Gardner, 1939	2 mice	---	M	1% in sesame oil, 0.1 cc. weekly, 10 inj.	S.C.	0	All dead in 100 days	100 days
1071.--DEHYDROANDROSTERONE 								
Korenchevsky and Hall, 1939	4 rats[6]	---	M	7.5 mg. in sesame oil 5 times weekly	Inj.	0	---	90-118 days

1. When tar is simultaneously applied to the skin the carcinogenic action of the tar is increased.
2. Adenocarcinoma of the stomach; sarcoma of the liver.
3. Of the stomach; also 2 animals with stomach papillomas.
4. For discussion of structure see Fieser and Fieser, 1949.
5. Compound number 581.
6. Senile, 2 with pneumonia.

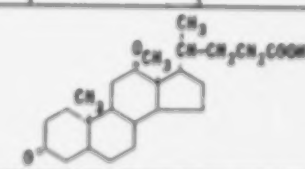
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

1072.--trans-DEHYDROANDROSTERONE[1]



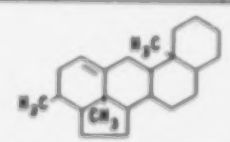
Bottomley and Folley, 1952[2]	6 guinea pigs	---	M	2 mg. in sesame oil daily	Inj.	0	---	31 days
Korenchevsky and Hall, 1939	Rats	---	M & F, castr.	7.5 mg. weekly	Inj.	0	---	2.5 to 4 mos.
Korenchevsky et al., 1939b	4 rats	---	F, castr.	1.5 mg. in sesame oil 5 times weekly	Inj.	0	---	Ca. 109 days
Korenchevsky et al., 1939c	--do--	---	M, castr.	--do--	Inj.	0	---	Ca. 105 days
Van Bogaren and Folley, 1939[3]	1 monkey	rhesus		1.5 gm. (total dose) in olive oil	Inj.	0	---	60 days
Korenchevsky and Hall, 1940	4 rats	---	F, castr.	7.5 mg. weekly	Inj.	0	---	53-146 days
Korenchevsky, 1941	Rats		M, castr.	7.5 mg. weekly	Inj.	0	---	Ca. 3.5 mos.

1073.--DEHYDRODESOXYCHOLIC ACID



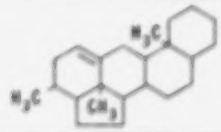
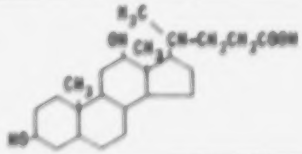
Pizzolato and Beard, 1945	30 rats	---	---	10-100 mg. repeated inj.[4]	I.P.	0	---	18 mos.

1074.--DEHYDRONORCHOLENE

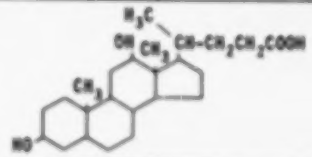
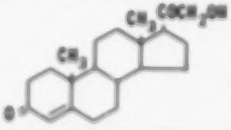


Bachmann et al., 1937	40 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	22 alive at 6 mos., 10 alive at 1 year	740 days
Donagh, 1958	Mice	---	---	1% aqueous soln. or 1% in oil, 41 times	Skin	0	---	100 days
Shear, 1950[5]	10 mice	Stock	---	5% in lard, 0.25 cc. repeated inj.	S.C.	0[5]	1 alive at 18 mos.	18 mos.
	8 mice	M	F	10 mg. crystals, repeated inj.	--do--	--do--	7 alive at 18 mos.	--do--

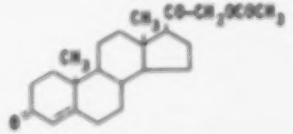
1. This is probably dehydroisoandrosterone.
2. Substance is called Δ^5-trans-dehydroandrosterone.
3. Substance is called Δ^5-trans-dehydroisoandrosterone.
4. 33 rats receiving irradiated dehydrodesoxycholic acid produced one sarcoma.
5. 2 hepatomas (possibly spontaneous) were obtained among the 18 animals.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1074.--DEHYDROCHOLENE (Continued) 								
Drucarey et al., 1961	6 rats	---	---	0.1g in peanut oil weekly, 6 times	S.C.	0	5 alive at nearly 19 years	Nearly 19 years
1075.--DESOXYCHOLIC ACID 								
Loeffler, 1928	Mice	---	---	Not over 20 mg. in food daily	P.O.	0	---	84 days
	Rabbits	---	---	0.1 gm. in food daily	P.O.	0	---	90-120 days
Alessandri, 1935	Mice	---	---	0.01 g. in milk daily	P.O.	0	---	At least 57 days
	--do--	---	---	2.5 mg. in alcohol every 2 days	S.C.	0	---	100 days
Cahlon, 1937	Mice	Amite	---	---	Inj. or P.O.	0	High mortality	5 mos.
	20 mice	--do--	---	In olive oil or benzene[1]	Inj.	5[2]	9 died in 60 days	Ca. 2 mos.
Rachmann et al., 1937	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	1 epi[3]., 0 pap.	17 alive at 6 mos., 5 alive at 1 year	776 days
	6 mice	Stock	F, castr.	0.3% in benzene weekly	Skin	0	5 alive at 6 mos., 4 alive at 1 year	476 days
Shear, 1938a	10 mice	♀	♀	10 mg. crystals[4]	S.C.	0	All alive at 4 mos.	4 mos.
Cahlon, 1939	Mice	---	---	---	Inj.	Tumors[5]	---	---
	Rats	---	---	---	Inj.	--do--	---	---
Badger et al., 1940	100 mice	Stock	---	0.3% in alcohol-benzene twice weekly	Skin	1 epi.	---	852 days
	10 mice	--do--	---	0.3% in alcohol-benzene, repeated inj.	S.C.	4 sarc.	---	422 days
	--do--	C3H	---	--do--	S.C.	7 sarc.	---	207 days
Cook et al., 1940a	Mice	---	---	---	Skin	0[6]	---	---
	--do--	---	---	---	S.C.	0[7]	---	---
	--do--	---	---	---	P.O.	0[8]	---	---
Cook et al., 1940b	100 mice	---	---	In so.n. in alcohol-benzene	Skin	1 epi.[9]	---	Over 800 days
	10 mice	Stock	---	In sesame oil, total dose 70 mg. in 15 inj. over 500 days	S.C.	3 sarc.[10]	5 alive at 6 mos.	At least 367 days
	10 mice	C3H	---	In sesame oil, repeated inj.	S.C.	1 sarc.	---	155 days

1. Along with cholesterol and various types of enzymes.
2. Obtained more by painting than by injection.
3. Probably to be regarded as rare example of a spontaneous epithelioma.
4. Site of injection traumatized.
5. Transplantable subcutaneous fibrosarcomas.
6. No liver lesions in 5 livers examined.
7. No liver lesions in 10 livers examined.
8. No liver lesions in 1 liver examined.
9. In 776 days.
10. First at 351 days.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1075.--DESOXYCHOLIC ACID (Continued) 								
Druckrey et al., 1941	6 rats	---	---	0.1g in peanut oil weekly 6 times	S.C.	0	4 alive at over 18 mos.	Over 18 mos.
Lee, 1941d[1]	Mice	C3H	---	In sesame oil, repeated inj.	S.C.	7 sarc.[2]	---	208 days
Shear, 1941	10 mice	A	---	Ca 10 mg. crystals, repeated inj.	S.C.	0	All died in 4 days	4 days
	6 mice	D	M	Ca 2 mg. crystals, repeated inj.	S.C.	0	---	1 year
	12 mice	A	---	Large amount of crystals, repeated inj.	S.C.	0	10 died in 3 days	1 year
	6 mice	A	---	0.25% aqueous soln. of sodium salt, 0.5 cc.	S.C.	0	---	18 mos.
	6 mice	D	---	--do--	S.C.	0	---	--do--
Shear and Leiter, 1941a	6 mice	dba	M	50 mg. crystals (total dose)	S.C.	0	3 alive at 12 mos.	13 mos.
	12 mice	dba and A	M & F	1.25 mg. in aq. soln. as Na salt, 7 inj.	S.C.	0	All alive at 10 mos.	18 mos.
Badger et al., 1942	10 mice	Stock	---	In sesame oil	inj.	4[3]	5 alive at 6 mos.	At least 421 days
	--do--	C3H		In sesame oil, repeated inj.	inj.	7[4]	---	208 days
Carruthers, 1942	Mice	C57 bl	---	1 mg. in aq. soln., pmb twice weekly	S.C.	0	---	In 14 weeks
Barrett and Larsen, 1944	42 rats	Wistar	M	0.005-0.125%[5] in food	P.O.	0	---	20 mos.
	50 rats	--do--	F	18-19 mg. pellets	S.C.	0	9 died or killed in 12 mos.	16 mos.
	46 mice	C3H	M	11-13 mg. pellets	S.C.	0	26 died in 4 mos.	6 mos.
	52 rats	Wistar	M	50% in cholesterol pellets; 15-16 mg.	S.C.	0	12 killed in 12 mos.	20 mos.
	50 mice	C3H	M	50% cholesterol pellets, 11-13 mg.	S.C.	0	---	5 mos.
Pizzolato and Beard, 1945	67 rats	---	---	10-100 mg., repeated inj.[6]	I.P.	0	---	18 mos.
1076.--DESOXYCORTICOSTERONE 								
Moehlig and Jaffe, 1942	5 dogs	---	---	5 and 10 mg. daily, some in propylene glycol	inj.	0	---	4 mos.

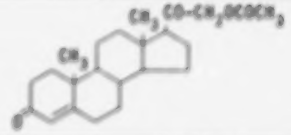
1. Citing Cook et al., 1940b.
2. First at 155 days.
3. Spindle-cell; first at between 355 and 421 days.
4. Spindle-cell; first at 155 days.
5. M.P. 178°.
6. 46 rats receiving irradiated desoxycholic acid produced 0 tumors.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1077.--DESOXYCORTICOSTERONE ACETATE 								
Kuhlmann et al., 1939	2 dogs[1]	---	F	20 mg. in peanut oil daily	S.C.	0	---	70 days
Carnes et al., 1941	27 rats	---	M & F	5 mg. in peanut oil daily for 4-8 weeks	S.C.	0	---	4-8 weeks
Lucken, 1941a	5 rats	Wistar	M	1 mg. in sesame oil daily	S.C.	0	---	42 days
Selmair and Grady, 1941b	32 mice	C3H	M & F	21.5 or 55 mg. (total dose) in sesame oil once or twice weekly for 8 mos.	S.C.	0[2]	All alive at 9 mos., 21 alive at 1 year	14 mos.
	17 mice	A	M	0.2 mg. in aq. dispersion, 5 times	I.V., tail	0[3]	---	20 weeks
Selmair and White, 1941	28 mice	A and C3H	M	Cholesteryl[4] pellets, 10-120, 3.0-4.0 mg.	S.C.	0	---	70 days
Burrill and Greene, 1942	12 rats[5]	---	M	25.7 mg. (av. wt.) in pellets	S.C.	0	Average survival 6.9 days	At least 50 days
	9 rats	---	M	22.6 mg. (av. wt.) in pellets	Intra-mesentery	0	--do--	--do--
	18 rats	---	M	20.9 mg. (av. wt.) in pellets	--do--	0	--do--	--do--
Forbes, 1942	15 rats	---	M & F	Pellets	S.C.	0	---	At least 64 days
	20[6] rats	---	M & F	Pellets	S.C.	0	---	At least 48 days
Kapoff et al., 1942	6 rabbits	---	---	2.5 mg. daily	Inj.	0	---	3 mos.
Rubard and Freed, 1942	12 dogs	---	M & F	2.5-1.0 mg. per kg. in sesame oil daily	S.C.	0	---	72 days
Ginestet et al., 1943	20 lizards	---	---	0.25 mg. in oil, 16 inj. weekly intervals	S.C.	0	---	Ca. 4 mos.
Sarason, 1943	29 rats	Wistar	M & F	2 mg. in alcohol daily	S.C.	0	---	1 mo.
	5 rats	---	M	2 mg. daily	S.C.	0	---	--do--
	5 rats	Wistar	F[7]	--do--	--do--	0	---	--do--
	10 rats	--do--	F	--do--	--do--	0	---	--do--
Selye and Hall, 1943	2 dogs	---	M & F	5-20 mg. in peanut oil twice daily	S.C.	0	---	46 and 70 days
	1 monkey	Macaca mulatta	M	20 mg. in peanut oil twice daily	S.C.	0	---	63 days
Selye et al., 1943	8 rats	Albino	M & F	5 mg. in 0.1 cc. in water twice daily for one month then 5 mg.	S.C.	0	---	53 days

1. One with unilateral nephrectomy.
2. Incidence of hepatomas and mammary tumors same as in controls.
3. Incidence of lung tumors same as in controls.
4. M.P. 158-160°.
5. Bilaterally adrenalectomized.
6. Hypophysectomized.
7. Ovariectomized.

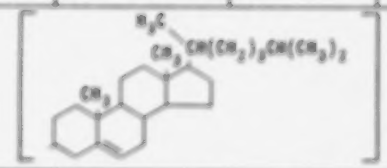
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

1077.--DESOXYCORTICOSTERONE ACETATE (Continued)



Shimkin and Mynan, 1945	20 mice[1] 21 mice[3] 20 mice[4]	C3H C3H --do--	F F F	10-20 mg. pellets twice, 6 mos. apart --do-- --do--	S.C. --do--	6[2] 5[2] 1[2]	--- --- ---	Over 18 mos. Over 13 mos. Over 19 mos.
Bruzzone et al., 1946	32 guinea pigs	---	W & F	50-336 micrograms absorbed daily	Implant	0	---	Ca. 4 mos.
Segaloff, 1946	Rats	---	W	18-27 mg. in pellets[5]	S.C.	0	---	58 days

1078.--DICHOLESTERYL ETHER

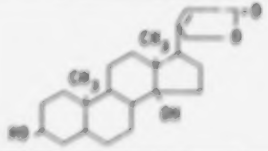


Larsen and Barrett, 1944	44 mice	C3H	W	8-12 mg. pellets[6]	S.C.	0	24 killed during 12 mos.	24 mos.

1079.--DIGITONIN[7]

Smith and Gardner, 1959	10 mice	---	W	1% in sesame oil, 0.1 cc. twice weekly, 10 inj.	S.C.	0	6 alive at 100 days	59[7] days

1080.--DIGITOXIGENIN

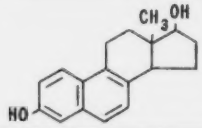
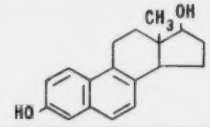
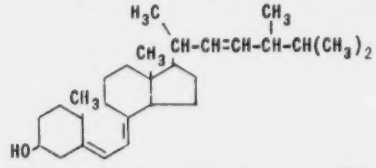
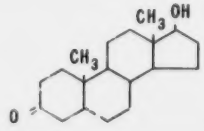


Druckrey, 1940	50 mice	---	---	1% soln. in benzene twice a week	Skin	0	All dead at 13½ mos.	13½ mos.
	--do--	---	---	5% soln. in benzene twice a week	Skin	0	--do--	--do--

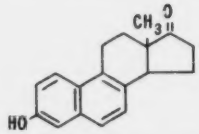
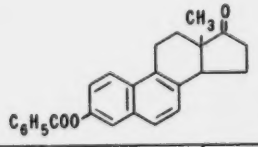
1081.--DIGITOXIN[7]

Smith and Gardner, 1959	2 mice	---	W	1% in sesame oil, 0.1 cc. twice weekly, 10 inj.	S.C.	0	1 alive at 100 days	40[8] days
Druckrey, 1940	50 mice	---	---	5% soln. in benzene twice weekly	Skin	0	All dead at 13½ mos.	13½ mos.

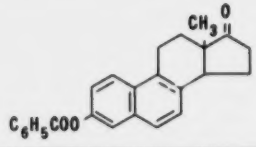
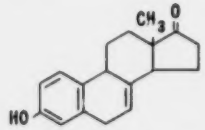
1. Ovariectomized.
2. Mammary. Result not significant with small numbers of animals.
3. Adrenalectomized.
4. Ovariectomized and adrenalectomized.
5. Different diets.
6. W.P. 204-205[7].
7. For discussion see Fieser and Fieser, 1949.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1082.--α-DIHYDROEQUILENIN 								
Mello, 1944	12 guinea pigs	---	F, castr.	20-43 mg. pellets	S.C.	Tumors[1]	---	90 days
Lipschütz et al., 1945a	51 guinea pigs		F	18-48 mg. pellets in spleen	Spleen	Tumors	---	At least 90 days
Mello, 1945	15 guinea pigs		F, castr.	24.5 mg. to 36.3 mg. pellets[2]	S.C.	Tumors	---	90 days
1083.--β-DIHYDROEQUILENIN 								
Mello, 1944	12 guinea pigs	---	F, castr.	20-43 mg. pellets	S.C.	Tumors[1]	---	90 days
Lipschütz, et al., 1945a	51 guinea pigs	---	F	18-48 mg. pellets	Spleen	Tumors	---	At least 90 days
Mello, 1945	14 guinea pigs	---	F, castr.	29 mg. -43.3 mg. in pellets	S.C.	Tumors	---	90 days
1084.--DIHYDROTACHYSTEROL 								
McChesney, 1944	32 rats	Albino	---	1-1.25 mg. per kg. body wt. daily in corn oil	P.O.[3]	0	---	Over 34 days
1085.--DIHYDROTESTOSTERONE 								
Bottomley and Folley, 1938	5 guinea pigs	---	M	2 mg. in sesame oil, daily	Inj.	0	---	32 days

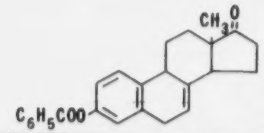
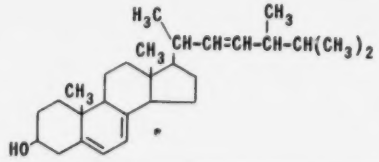
1. Abdominal fibroids.
2. 7.1 mg. -14.8 mg. absorbed.
3. By stomach tube.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1086.--EQUILENIN 								
Barry, et al., 1935	5 mice	Stock	M	0.1% in benzene twice weekly	Skin	0	5 alive at 6 mos.	245 days
Burrows, 1935a	10 mice	---	---	0.01-0.1%[1] in benzene or alcohol twice weekly	--do--	0	---	230 days
Burrows, 1935c	Mice	---	M	0.1% in benzene twice weekly	--do--	0	---	Over 50 days
Burrows, 1935d	--do--	---	---	In benzene	--do--	0	---	---
Burrows, 1936b	--do--	Stock	M	0.1% in benzene twice weekly	--do--	0	---	Avg. of 255 days
Figdlist, 1941	32 guinea pigs	---	F, castr.	In cylinder, 0.1-2.85 mg. absorbed	S.C.	Tumors[2]	---	120 days
Lipschütz, et al., 1942a	21 guinea pigs	---	--do--	Pellets	S.C.	Tumors[3]	---	50-120 days
Mello, 1944	15 guinea pigs	---	--do--	20-43 mg. pellets	S.C.	Tumors[4]	---	90 days
Lipschütz, et al., 1945a	51 guinea pigs	---	F	18-48 mg. pellets	Spleen	Tumors	---	At least 90 days
Mello, 1945	15 guinea pigs	---	F, castr.	In pellets, 6.9-12 mg. absorbed	S.C.	Tumors[4]	---	89 days
1087.--EQUILENIN BENZOATE 								
Lacassagne, 1936b	5 mice	R3	M & F	0.1% in oil, 0.05 cc. weekly	---	4[5]	1 died early	440 days
Lacassagne, 1936d	5 mice	---	M & F	---	Inj.	3[6]	--do--	10 mos.
Lacassagne, 1937a	Mice	R3	---	0.1% in oil, 0.05 cc. weekly	S.C.	1 sarc.[7]	---	---
Lacassagne and Raynaud, 1937a,b	Mice	---	---	0.1% in oil, 0.05 cc. weekly	Inj.	0	---	---
Lacassagne, 1938a	5 mice	R3	M & F	0.1% in oil, 0.05 cc. weekly	S.C.	4[8]	---	---

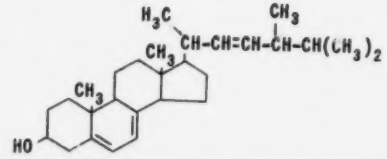
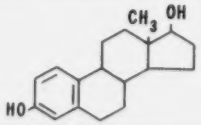
1. C.P. grade of substance used.
2. Throughout abdomen. First in 21 days.
3. Uterine and non-genital.
4. Abdominal fibroids.
5. Mammary adenocarcinomas.
6. Mammary.
7. In a male. Mammary adenocarcinoma in all but one.
8. At least one sarcoma at site; and the rest chiefly mammary adenocarcinomas.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1087.--EQUILENIN BENZOATE (Continued) 								
Lacassagne, 1938a (Continued)	6 mice	17 nc	M & F	0.1% in oil, 0.05 cc. weekly	S.C.	0	---	---
	8 mice	30	--do--	--do--	--do--	4[1]	---	---
	2 mice	39	--do--	--do--	--do--	1[1]	---	---
Gardner and Allen, 1939	6 mice	C3H	F	100 micrograms in sesame oil weekly	S.C.	3[2]	---	Avg. of 209 days
Gardner, et al., 1944	12 mice	C3H	---	0.1 mg. in sesame oil, weekly	S.C.	0[3]	---	---
1088.--EQUILIN 								
Barry, et al., 1935	5 mice	Stock	M	0.1% in benzene twice weekly	Skin	0	4 alive at 6 mos. 3 alive at 246 days	1 year
Burrows, 1935a	10 mice	---	---	0.01-0.1%[4] in benzene or alcohol twice weekly	--do--	0	---	---
Burrows, 1935c	Mice	---	M	0.1% in benzene twice weekly	--do--	0[5]	---	At least 246 days
Burrows, 1935d	Mice	---	---	In benzene	Skin	0	---	---
Burrows, 1936b	Mice	Stock	M	0.1% in benzene twice weekly	Skin	0	---	Avg. of 115 days
Burrows, 1936c	58 mice	---	---	--do--	--do--	0	---	291 days
Gardner, et al., 1936d	Mice	A	M & F	---	Inj.	0	---	125 days
Gardner, 1937b	15 mice	A	F	0.1 mg. weekly	---	0	---	Over 125 days
Lacassagne, 1937a[6]	Mice	17 nc	---	---	Inj.	1[7]	---	533 days
Gardner and Allen, 1939	4 mice	C3H	F	100 micrograms in sesame oil weekly	S.C.	1 sarc.	---	Avg. of 292 days

1. Mammary adenocarcinomas, chiefly.
2. Mammary carcinomas; also one cervical cancer.
3. Lymphoid.
4. C.P. grade of substance used.
5. Alveolar formation called "benign adenomata" observed.
6. See also under estrone.
7. In a male at 533 days.

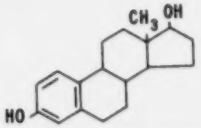
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1089.--EQUILIN BENZOATE 								
Gardner, et al., 1936d	Mice	A	M & F	---	Inj.	Several[1]	---	At least 125 days
Lacassagne, 1936b	5 mice	R3	--do--	0.1% in oil, 0.05 cc. weekly	---	5[2]	---	321 days
Lacassagne, 1936d	--do--	---	--do--	---	Inj.	4[2]	1 neg. alive at 7 mos.	7 mos.
Gardner, 1937a	6 mice	A	M	0.1 mg. weekly	S.C.	0	---	16-34 weeks
Gardner, 1937b	14 mice	---	---	--do--	---	2[1]	---	Over 125 days
Lacassagne and Raynaud, 1937a,b	Mice	---	---	0.1% in oil, 0.05 cc. weekly	Inj.	0	---	---
Lacassagne, 1938a	5 mice	R3	M & F	0.1% in oil, 0.05 cc. weekly	S.C.	5[3]	---	---
	7 mice	17 nc	--do--	--do--	--do--	2[4]	---	---
	6 mice	30	--do--	--do--	--do--	1 sarc.[5]	---	---
	2 mice	39	--do--	--do--	--do--	0	---	---
Gardner and Pfeiffer, 1938	Mice	4 inbred strains	---	0.1 mg. in oil of benne, weekly	Inj.	0[6]	---	---
Gardner and Allen, 1939	3 mice	C3H	F	100 micrograms in sesame oil weekly	S.C.	1[7]	---	Avg. of 260 days
Cook, et al., 1940a	Mice	---	---	---	S.C.	0[8]	---	---
Gardner, et al., 1944	12 mice	C3H	---	0.1 mg. in sesame oil weekly	S.C.	4[9]	---	---
1090.--ERGOSTEROL 								
Barry, et al., 1935	50 mice	Stock	---	0.3% in benzene twice weekly (m.p. 163°)	Skin	0	34 alive at 6 mos. 11 alive at 1 year	597 days
	20 mice	--do--	F	0.3% in benzene twice weekly	Skin	0	18 alive at 1 year	583 days

1. Mammary.
2. Mammary adenocarcinomas.
3. Mammary adenocarcinomas, chiefly.
4. A sarcoma involving lymph nodes.
5. Also one lymphosarcoma of the thymus.
6. Skeletal changes studied.
7. Mammary carcinoma.
8. No liver lesions in 2 livers examined.
9. Lymphoid.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1090.--ERGOSTEROL (Continued) 								
Bachmann, et al., 1937	50 mice	Stock	---	0.3% in benzene twice weekly (m.p. 163°)	Skin	0	34 alive at 6 mos. 11 alive at 1 year	638 days
	20	--do--	F	--do--	--do--	0	18 alive at 1 year	784 days
Schmid, 1937a	Guinea pigs	---	---	0.2% in linseed oil, 0.5 cc.	Gall bladder	0	---	---
Schmid, 1937b	8 guinea pigs	---	---	0.2% in linseed oil	--do--	0	---	0.5-12 mos.
Polettini, 1938	20 rats	White	---	Oily soln. of irradiated ergosterol every 2-3 days for 13 mos.	Skin	Tumors[1]	---	---
	--do--	--do--	---	0.20 cc. oil soln. of irradiated ergosterol every 4-5 days	S.C.	Sarc.[2]		
Reynolds and Burns, 1943	40 rats	---	M	4,000-20,000 I.U. per kg. body wt., daily	---	0	---	100-190 days
Pizzolato and Beard, 1945	22 rats	---	---	10-100 mg. repeated inj.	I.P.	0	---	18 mos.
1091.--ESTRADIOL 								
Burrows, 1935c	Mice	---	M	0.1% in alcohol twice weekly	Skin	0	---	Over 50 days
Burrows, 1935d	--do--	---	---	In benzene	--do--	0	---	---
Mazer, et al., 1935	30 rabbits	---	F	80,000 to 150,000 r. u. total dose	Inj.	0	---	7 to 57 days
Burrows, 1936b	Mice	Stock	M	0.05% in benzene or 0.1% in alcohol twice weekly	Skin	0	---	Avg. of 149 days
Burrows, 1936c	11 mice	---	M	--do--	--do--	0	---	284 days
Dessau, 1937	Guinea pigs	---	F, normal and castr.	7 micrograms[3] in oil daily	S.C.	0	---	90 days

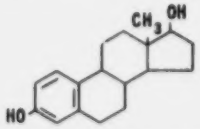
1. Mammary cancer; first at 18 mos.
2. Lymphoid.
3. Pure substance used.

1091.--ESTRADIOL (Continued)



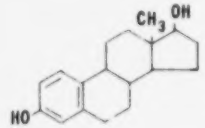
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Lacassagne and Nyka, 1937c	Mice	R3	---	100 micrograms weekly	---	Many[1]	All dead in 8 mos.	8 mos.
	--do--	17 nc	M & F	--do--	---	Some[2]	---	Over 1 year
	--do--	30	---	--do--	---	0	---	Over 6 mos.
	--do--	39	---	--do--	---	0	---	18 mos.
Raynaud, 1937	7 cats	---	---	0.1% in soln. 0.25 cc. twice weekly	Inj.	0	---	25 to 48 days
Gomez and Turner, 1938	10 rabbits	---	F	20 r. u. daily	S.C.	0	---	25 days
	--do--	---	F	20 r. u. plus 0.1 mg. anol daily	S.C.	0	---	--do--
Deanesly, 1939b	19 rats	---	M	11.80 to 16.25 mg. as tablet	S.C.	3[3]	---	50 to 270 days
Grumbrecht and Loeser, 1939	15 rats	---	F	1 mg. in sesame oil, daily	P.O.	0	---	45 days
Hume, et al., 1939	Rats	---	M	66 micrograms daily plus 5 micrograms 3 times weekly	P.O.	0[4]	---	Avg. of 156 days
Lipschütz, et al., 1939d	27 guinea pigs	---	F, castr.	5-400 micrograms thrice weekly	S.C.	8[5]	---	98 to 123 days
Lipschütz and Vargas, Jr., 1939a	4 guinea pigs	---	--do--	100 micrograms in vegetable oils thrice weekly	S.C.	1[6]	---	86 days
Lipschütz and Vargas, Jr., 1939c	7 guinea pigs	---	--do--	20 mg. tablet	S.C.	0[7]	---	19-50 days
	--do--	---	--do--	50 mg. tablet	S.C.	--do--	---	22 to 54 days
Chaume and Vargas, Jr., 1940	42 guinea pigs	---	M & F. castr. and normal	Tablets	I.P. or S.C.	Tumors[8]	---	53 days
Custo, 1940	20 guinea pigs	---	F, normal and castr.	1 or 5 mg. weekly	Inj.	Several[9]	---	8 mos.
Geist, et al., 1940	5 human beings	---	F	15-25 mg. pellet	S.C.	0	---	23-238 days
Rodriguez[10]	Guinea pigs	---	F, castr.	5-80 micrograms thrice weekly	Inj.	0	---	3 mos.

1. Mammary adenocarcinomas.
2. Mammary adenocarcinomas; some lung nodules; one with adenomatous nodules of the hypophysis.
3. Of the pituitary gland noticed after 270 days.
4. Bladder papillomatosis observed.
5. 5 genital and 3 extra-genital.
6. Of the uterus; also one a typical fibromyoma of the uterus.
7. All with benign uterine and extra-genital tumors.
8. Genital and extra-genital fibromas.
9. Mostly of uterus; some also of stomach, liver and spleen.
10. Unpublished results cited by Lipschütz and Vargas, Jr., 1940.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1091.--ESTRADIOL (Continued) 								
Rodriguez, 1940	47 guinea pigs	---	F, castr.	38-20, 800 micrograms (total dose) thrice weekly from 95 to 123 days	S.C.	9[1]	---	123 days
Szabo, 1940b	Guinea pigs	---	F, castr.	Tablets	S.C.	Tumors[2]	---	At least 45 days
Walter, et al., 1940	8 human beings	---	F	15-25 mg. pellets	S.C.	0	---	Ca. 1 year
Biskind, 1941a	13 rats	---	F	Pellets, 1.1-1.8 mg.	S.C. or Spleen	0	---	70 days
Deanesly and Parkes, 1941	20 rats[3]	---	M	Pellet of avg. wt. 14.0 mg.	S.C.	0	---	-1 year
Figelist, 1941	30 guinea pigs	---	F, castr.	By cylinder 0.1-5.5 mg. absorbed	S.C.	Tumors[4]	---	21-80 days
Lipschütz, 1941	Guinea pigs	---	--do--	Tablets	S.C.	Tumors[5]	---	80 days
Lipschütz, et al., 1941c	Over 6 guinea pigs	---	--do--	Pellets	S.C.	8[6]	---	2 mos.
Lipschütz and Vargas, Jr., 1941c	64 guinea pigs	---	F, castr.	1-400 micrograms thrice weekly for 6-16 weeks	Inj.	Tumors[7]	---	At least 16 weeks
Lipschütz and Vargas, Jr., 1941e	20 guinea pigs	---	F, castr.	Tablets	S.C.	Tumors[5]	---	62 days
Lipschütz and Vargas, Jr., 1941a	17 guinea pigs	---	F	21 mg. (avg.) tablet	S.C.	0	---	73 days
Lipschütz and Zañartu, 1941	9 guinea pigs	---	F, castr.	Pellets	S.C.	8[6]	---	73 days
Von Wattenwyl, 1941	17 guinea pigs	---	F & M, castr.	Tablets	S.C.	0	---	At least 207 days
Bischoff, et al., 1942b	36 mice	Marsh-Buffalo	M	0.08 mg. in sesame oil twice weekly	Parenterally	Tumors[8]	---	12 mos.
	--do--	--do--	M, castr.	--do--	--do--	Tumors[9]	---	--do--
Bischoff, et al., 1942a	40 mice	--do--	F, normal and castr.	0.2% in sesame oil, 0.04 cc. twice weekly for 6 mos.	I.M. or S.C.	Tumors[10]	---	At least 12 mos.

1. Fibromas or fibromyomas on uterus, spleen, mesentery, stomach and kidney.
2. Genital and extra-genital fibromas.
3. Hypophysectomized.
4. Abdominal; first at 21 days.
5. Uterine and extra-genital fibroids.
6. Abdominal.
7. Uterine fibroids.
8. 3 lymphoid; not significantly above controls.
9. 12 lymphoid and 2 adenocarcinoma of the breast.
10. Lymphosarcoma and adenocarcinoma of the breast.

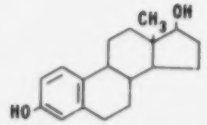
1091.--ESTRADIOL (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Elqueta-Elqueta, 1942	9 guinea pigs	---	F, castr.	Tablets 11-64 mg. daily	Intrathoracic	1	---	126 days
Forbes, 1942	6 rats	---	M & F	Pellets	S.C.	0	---	180 days
Gescnickter and Byrnes, 1942	Rats	---	---	Successive pellets	S.C.	Tumors[1]	---	At least 310 days
	1 rat	---	F	Multiple pellets	S.C.	1[2]	---	47 days
	Rats	---	---	100 micrograms in oil daily	Inj.	Tumors[1]	---	At least 290 days
Lipschütz, et al., 1942b	8 guinea pigs	---	F, castr.	5.4-9.6 mg. tablets	S.C.	7[2]	---	64 days
Lipschütz, et al., 1942a	15 guinea pigs	---	--do--	Pellets	S.C.	Tumors[3]	---	80 days
Lipschütz, et al., 1942c	47 guinea pigs	---	F	Tablets 5-74 micrograms daily absorbed	S.C.	46[2]	---	62 days
Lipschütz and Zañartu, 1942	11 guinea pigs	---	F, castr.	Pellets 2.1-5.0 mg.	S.C.	9[4]	---	73 days
Maas Jensen, 1942	27 guinea pigs	---	--do--	0.8-5.8 mg. (absorbed) capsules	S.C.	Tumors[5]	---	74-86 days
	5 guinea pigs	---	--do--	2.4-5.2 mg. absorbed	S.C.	--do--	---	114 days
	11 guinea pigs	---	--do--	4.1-7.6 mg. absorbed	S.C.	--do--	---	130 days
Pinzon, 1942	8 guinea pigs	---	F, castr.	0.6-2.5 mg. absorbed every 20 days	Inj.	0	---	70 days
Saavedra, 1942	20 guinea pigs	---	F, castr.	2.2-4.1 mg. absorbed	S.C.	Tumors[5]	---	62 days
Sierra, 1942	21 guinea pigs	---	--do--	250-5,000 micrograms	Inj.	0	---	Ca. 36 days
Carrasco, 1943	8 guinea pigs	---	F	Pellets 0.8-1.4 mg. absorbed	S.C.	Tumors[5]	---	62 days
	20 guinea pigs	---	F	0.6-5.5 mg. absorbed	Intrahepatic	--do--	---	--do--
Engle, et al., 1945	5 monkeys	Macaca mulatta	F	Crystals or pellets every 5-6 weeks (total dose 575-825 mg.)	S.C.	0	---	28 mos.

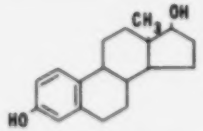
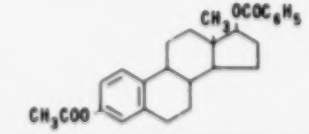
1. Mammary cancer.
2. Uterine and extra-genital fibroids.
3. Uterine and non-genital.
4. Uterine and other abdominal fibroids.
5. Abdominal.

1091.--ESTRADIOL (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Gonzales, 1943b	15 guinea pigs	---	Castr.	Pellets 39-111 micrograms absorbed	S.C.	4[1]	---	64 days
Iglesias, et al., 1943	8 guinea pigs	---	F, castr.	31-42 mg. absorbed	S.C.	Tumors	---	106 days
Lipschütz and Carrasco, 1943	8 guinea pigs	---	F, castr.	0.6 mg. (avg.) absorbed	S.C.	Tumors	---	60 days
	11 guinea pigs	---	--do--	1.1 mg. (avg.) absorbed	Intrahepatic	--do--	---	--do--
	9 guinea pigs	---	--do--	1.0 mg. (avg.) absorbed	--do--	---	---	--do--
Lipschütz, et al., 1943	15 guinea pigs	---	F	16-46 mg. absorbed daily	S.C.	12	---	At least 90 days
Riesco, 1943	6 guinea pigs	---	Castr.	5% in cholesterol, 0.16-1.07 micrograms daily	S.C.	2[2]	---	Ca. 8 mos.
	--do--	---	--do--	5% in cholesterol, 0.41-89 micrograms daily	S.C.	Tumors[3]	---	--do--
	--do--	---	--do--	5% in cholesterol, 27-92 micrograms daily	S.C.	1[3]	---	--do--
	--do--	---	--do--	5% in cholesterol, 7.25-0.66 micrograms absorbed	S.C.	3[4]	---	--do--
Vargas, Jr., 1943a	4 monkeys	Rhesus	F, castr.	70-113 mg. tablets	S.C.	0[5]	3 alive at 285 days	69-290 days
Vargas, Jr., 1943b	21 guinea pigs	Inbred	F[6]	5-10 mg. as pellet	S.C.	19[7]	---	69 days
	15 guinea pigs	Inbred	F[8]	--do--	S.C.	14[7]	---	--do--
Vargas, Jr., 1943c	17 rats	AB & Wistar	M & F[9]	8.2-9.4 mg. tablets in cholesterol	S.C.	0	---	90 days
Dosne, 1944	10 guinea pigs	---	F, castr.	Pellets, also 40% pellets of cholesterol[10]	S.C.	Tumors[11]	---	96 days
Gardner, et al., 1944	12 mice	C3H	---	Pellets	S.C.	4[12]	---	---
Lipschütz and Acuña, 1944	8 guinea pigs	---	F, castr.	0.6-2.3 mg. tablet	Spleen	0	---	67-70 days
	7 guinea pigs	---	--do--	0.6-2.0 mg. tablet	S.C.	7[11]	---	60-62 days

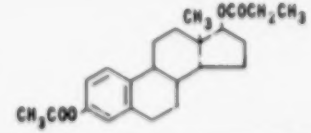
1. Of the uterus.
2. Of the digestive system.
3. Abdominal.
4. 2 uterine and one of the spleen.
5. Fibromatosis observed in 3 animals.
6. Hypophysectomized. All but 3 castrated.
7. Uterine and extra-genital fibroids.
8. All but 3 castrated.
9. Castrated females.
10. Other animals had also pellets of progesterone or desoxycorticosterone acetate.
11. Abdominal fibroids.
12. Lymphoid.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1091.--ESTRADIOL (Continued) 								
Lipschütz, et al., 1944	15 guinea pigs	---	F, castr.	Tablets	S.C.	15[1]	---	90 days
Lipschütz and Carrasco, 1944	5 guinea pigs	---	F, castr.	0.6-2.0 mg. tablet	S.C.	8[2]	---	60 days
	20 guinea pigs	---	--do--	0.6-4.8 mg. tablet	Liver	6[2]	---	--do--
Lipschütz, and Maas, 1944	45 guinea pigs	---	--do--	Pellets, 6-18 mg.	S.C.	37[1]	---	74-130 days
Mello, 1944	10 guinea pigs	---	F, castr.	Ca. 5.5 mg. pellet	S.C.	Tumors[2]	---	90 days
Segaloff and Segaloff, 1944	Rats	Sprague-Dawley	F	50-100 micrograms	Spleen	0	---	At least 5 weeks
	--do--	--do--	F	1-2 micrograms	S.C.	0	---	--do--
Selye, 1944	10 rats	---	M	50 micrograms in peanut oil daily	S.C.	Tumors[3]	---	14 mos.
Bischoff, et al., 1945	220 mice	Marsh-Buffalo	M & F, castr. and normal	0.98 mg. (total dose) in sesame oil, over 7 mos.	S.C. or I.M.	Tumors[4]	---	16½ mos.
Lipschütz, et al., 1945b	6 guinea pigs	---	M, castr.	Pellets	S.C.	2[5]	---	286 days
Mello, 1945	10 guinea pigs	---	F, castr.	5.5 mg. in tablet, 1.7 mg. absorbed	S.C.	100%[2]	---	90 days
Adres Riesco, 1946	6 guinea pigs	---	F, castr.	5% plus cholesterol	S.C.	Tumors	---	125 days
	--do--	---	--do--	--do--	S.C.	Adenomas[6]	---	550 days
1092.--ESTRADIOL-3-ACETATE-17-BENZOATE 								
Miescher, et al., 1938c	Rats	---	F, castr.	20 or 50 micrograms (total dose) in sesame oil	S.C.	0	---	Up to 80 days
	--do--	---	--do--	50 micrograms (total dose) in sesame oil	S.C.	0	---	30 days

1. Uterine and other abdominal fibroids.
2. Abdominal fibroids.
3. Adenoma of the anterior lobe of the pituitary.
4. Estradiol without effect on development of lymphoid tumors and mammary adenocarcinoma.
5. Of the utricular bed.
6. Malignant.

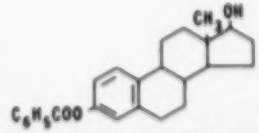
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

1093.--ESTRADIOL-3-ACETATE-17-PROPIONATE



Mieschor, et al., 1938c	Rats	---	F	50 micrograms (total dose) in sesame oil	S.C.	0	---	50 days

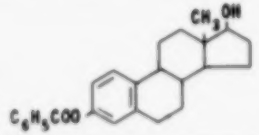
1094.--ESTRADIOL BENZOATE



Claubery and Breipohl, 1935	Rats	---	F, castr.	2,400 m. u. in oil, total dose	Inj.	0	---	48 days
Gardner, et al., 1936a[1]	Mice	A	M & F	---	Inj.	Several[2]	---	At least 129 days
	6 mice	C3H	F	100 i. u. weekly	---	2[2]	---	---
Grumbrecht, 1936	Rats	White	F	100 to 6,000 m. u. in olive oil daily	S.C.	0	---	50-70 days
Kaufmann and Steinkamm, 1936	24 rats	White	F, castr.	115 mg. total dose	S.C.	0	High mortality	47 days
	16 rats	--do--	F	100 micrograms daily	S.C.	0	---	30-66 days
Krekels, 1936	150 mice[3]	---	M & F	500 m. u. in oil weekly	S.C.	0	---	Ca. 8 mos.
Zondek, 1936a	Rabbits	---	F	2,000 to 25,000 m. u. weekly	S.C.	0	---	At least 3.5 mos.
	Rats	---	F	Large doses for weeks or months	---	0	---	Several mos.
Zondek, 1936c	Rabbits	---	F	1,000 m. u. twice weekly	S.C.	0	---	Several mos.
	151 rats	---	F	5,000 m. u. twice weekly	S.C.	0	---	18 weeks
	Rats	---	M & F	Soln. in benzene 3 times weekly	Skin	0	---	---
	--do--	---	---	5,000 m. u. twice weekly	S.C.	0	---	30 weeks
	Fowls	---	M	25,000 m. u. twice weekly	S.C.	0	---	18 weeks
Arnold, et al., 1937	19 dogs	---	M & F	44 to 4,400 micrograms in oil daily	I.M.	0	---	128 days
Del Castillo and Sammartino, 1937	13 rats	White	M & F, normal and castr.	2,400 i. u. in sesame oil twice weekly	S.C.	0	---	302 days
Gardner, 1937a	15 mice	A	M	500 i. u. weekly	S.C.	0	---	76 to 250 days
	8 mice	C3H	M	--do--	S.C.	0	---	119 to 287 days

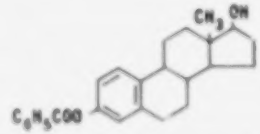
1. See also under estrone benzoate.
2. Mammary tumors.
3. With chronic arsenic poisoning.

1094.--ESTRADIOL BENZOATE (Continued)

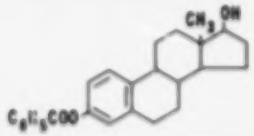


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Gardner, 1937a (Continued)	8 mice	N	M	500 i.u. weekly	S.C.	0	---	Comparable period
	--do--	F	M	--do--	S.C.	0	---	--do--
	5 mice	CBA	M	--do--	S.C.	0	---	--do--
Laruffi, 1937	20 rats	---	F, castr.	25 to 100 b.u. in sesame oil daily	I.M.	0	---	30 days
Gomez, et al., 1937	6 mice[1]	---	M	50 i.u. daily	Inj.	0	---	20 to 60 days
Lacassagne and Raynaud, 1937a,b	Mice	---	---	2.1% in oil, 0.05 cc. weekly	Inj.	0	---	---
Murray and Steinhamm, 1937	9 rats	---	F, castr.	175 mg. total dose	---	0	---	47 days
Zondek, 1937a	140 rats	---	---	5,000 m.u. twice weekly	---	0	---	7 mos.
Zondek, 1937b	187 rats	---	---	5,000 m.u. twice weekly	S.C.	19[2]	23 alive at 4-5 mos.	At least 7 mos.
	Rats	---	M & F	0.1% in benzene twice weekly	Skin	5[2]	---	63 weeks
	Foals	White Leghorn	---	25,000 to 50,000 m.u. twice weekly	Inj.	0	---	At least 18 weeks
Arnold, et al., 1938	94 rats	---	F	1,000 and 12,000 to 15,000 i.b.u.	Uterus	0	---	14-29 days
Ball, 1938	8 rats	---	F	0.25-5 r.u. daily	Inj.	0	---	2 mos.
Biedermann, 1938	37 rats	---	F	50 i.b.u. in linseed oil daily, plus 6 i.b.u. in linseed oil daily[4]	S.C., intravaginal	0[3]	---	600 days
Burns, et al., 1938	Mice	D	---	50 r.u. in water 6 times weekly	Inj.	1[5]	---	At least 17 mos.
	--do--	Hea	---	100 r.u. in oil weekly	Inj.	1[6]	---	At least 7.5 mos.
	--do--	Buffalo --do--	---	50 r.u. in water twice weekly	S.C.	1 sarc.[7]	---	At least 12.5 mos.
	--do--	C57	---	--do--	S.C.	1 sarc.[8]	---	At least 12 mos.
	--do--	C3H	---	50 r.u. in water 6 times weekly	S.C.	3 sarc.[9]	---	At least 18.5 mos.
Del Castillo and Lommartino, 1938	15 rats	---	M & F, normal and castr.	2,400 i.u. in poppyseed oil twice weekly	Inj.	3(?)[10]	---	245-302 days

1. Hypophysectomized.
2. Pituitary.
3. One adenomyosis of the uterus observed.
4. A few also received later 150 i.b.u. subcutaneously and 60 i.b.u. intravaginally.
5. In a female at 17 mos.
6. Sarcoma of the vagina, lymphosarcoma in thoracic cavity and mammary carcinoma.
7. In female at 12.5 mos.
8. Near site in male at 12 mos.
9. At or near site, in males at 16 to 18.5 mos.
10. Possible adenomas of the cortex.

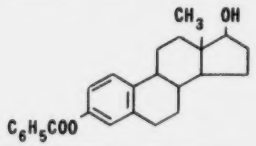
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1094.--ESTRADIOL BENZOATE (Continued) 								
Engle and Smith, 1938	23 monkeys	---	F, castr.	76,500 and 154,000 r.u. respectively (total dose)	Inj.	0	---	82 days
Gardner and Pfeiffer, 1938	Mice	Inbred	---	100-1,000 i.u. in oil of benne weekly	Inj.	0[1]	---	Up to 548 days
Gardner, et al., 1938	Mice	C3H	---	500 i.u. every 3 weeks, then weekly	---	1[2]	---	319 days
Gardner, et al., 1938[3]	6 mice	C3H	M	500 i.u. in oil weekly[3]	S.C.	0	---	26 weeks
Iglesias, 1938	24 guinea pigs	---	F, castr.	20 to 80 micrograms in olive oil thrice weekly	S.C.	14[4]	---	4 to 8 mos.
Lacassagne, 1938a	3 mice	H3	M & F	0.1% in oil, 0.05 cc. weekly	S.C.	3[5]	---	---
	---do---	17 nc	---do---	---do---	S.C.	0	---	---
	5 mice	30	M & F	---do---	S.C.	0	---	---
	6 mice	39	---do---	---do---	S.C.	1[6]	---	---
Lawrence and Gardner, 1938	Mice	A	F	34,500 i.u. (total dose) in oil	S.C.	1[7]	---	296 days
Lipschütz and Iglesias, 1938a	24 guinea pigs	---	F, castr.	The equivalent of 20 to 80 micrograms of estradiol in olive oil thrice weekly	S.C.	2[8]	---	4-10 mos.
Loeb et al., 1938	63 mice	Inbred	F	1 to 50 r.u. in water daily	S.C.	0	---	At least 12 mos.
	25 mice	---do---	F	50 r.u. in water daily	S.C.	0	---	At least 16.5 mos.
	161 mice	---do---	F	100 or more r.u. in oil weekly	S.C.	0	---	---
Moricard and Cauchois, 1938	13 guinea pigs	---	F	1 mg. weekly	---	Tumors[9]	---	8-32 weeks
	2 guinea pigs	---	F	5 mg. weekly	---	Tumors[9]	---	8-32 weeks
Pfeiffer and Gardner, 1938	Pigeons	---	M & F	1,000 i.u. in sesame oil daily	I.M., breast	0	---	69 days
Robson et al., 1938	Mice	---	F	125 micrograms in oil twice daily, 4 inj.	S.C.	0	---	At least 28 days
Vargas, jr. and Lipschütz, 1938	10 guinea pigs	---	F, castr.	80 micrograms in olive oil 3 times weekly	S.C.	10[10]	---	4 mos.

1. Skeletal changes studied.
2. Of the cervix; also metastases to lower abdominal lymph nodes.
3. A fee also received later 150 i.u. subcutaneously and 60 i.u. intravaginally.
4. See under Estrone.
5. In 16 animals autopsied at 4 mos.; both uterine and extra-uterine.
6. Mammary adenocarcinomas, chiefly.
7. Of the uterus; also leukemia observed.
8. Both uterine and extra-uterine. For a further description see Lipschütz and Iglesias, 1938.
9. All animals (61 treated 18 weeks developed uterine fibromas.
10. Genital and extra-genital tumors.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1094.--ESTRADIOL BENZOATE (Continued) 								
Wolfe and Wright, 1938	10 rats	---	F, normal and castr.	200 r.u. daily	Inj.	0	---	30 days
	--do--	---	--do--	--do--	Inj.	0	---	80 days
	9 rats	---	M & F, normal and castr.	--do--	Inj.	0[1]	---	247 days
	8 rats	---	F, castr.	--do--	Inj.	0[1]	---	247 days
Zondek, 1938a	Rats	---	---	252,000 m.u. total dose	Inj.	0	---	16 weeks
	14 rats	---	M, castr.	361,000 m.u. total dose	Inj.	0	---	18 weeks
	Rats	---	---	---	--do--	Tumors[2]	---	8 mos.
	11 rats	---	F	---	Inj.	11[3]	---	Avg. of 39 weeks
	12 rats	---	M	---	--do--	8[3]	---	--do--
	4 rats	---	---	5,000 m.u. 4 times weekly	--do--	3[3]	---	28 weeks
	--do--	---	M	5,000 m.u. twice weekly	--do--	0	---	At least 34 weeks
	7 rats	---	F	5,000 m.u. twice weekly	--do--	0	---	42 weeks
	Rats	---	---	In benzene soln.[4]	Skin	2	---	55 weeks
Zondek, 1938b	4 rats	---	F	500 m.u. in olive oil twice weekly	S.C.	0	---	9 mos.
	--do--	---	F	--do--	Skin	0	---	--do--
	--do--	---	F	500 m.u. in benzene twice weekly	--do--	1[5]	---	--do--
Alexin, 1939	15 rats	---	F, normal and castr.	500 micrograms daily	Inj.	0	---	90 days
Bellotio, 1939	23 guinea pigs	---	F, castr.	0.1-80 micrograms in olive oil thrice weekly	Inj., back	Tumors[6]	---	85-88 days
Burns and Schonken, 1939	151 mice	C3H	M	400 to 3,500 r.u. in sesame oil, total dose	S.C.	0	---	35 weeks
Carradus and Bolliger, 1939	10 phalangers[7]		M	700-50,000 i.u. in oil weekly	I.M.	0[8]	3 died in 24 days	122 days
Emmens, 1939a	3 fowls	Brown Leghorn	M	105 to 170 mg. in arachis oil, total dose	I.M.	0	---	212 to 292 days

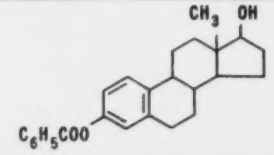
1. Adenomatous pituitaries in 9 animals.
2. All developed tumors of the hypophysis.
3. Of the hypophysis.
4. Plus 0.2 mg. of benzpyrene in benzene three times weekly.
5. Pituitary.
6. Abdominal.
7. "Possums" -*Trichosaurus vulpecula*.
8. In one case, intraurethral papillomas.

1094.--ESTRADIOL BENZOATE (Continued)



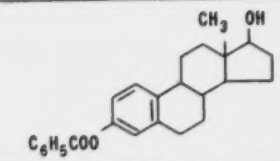
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals wtih tumors	Survival	Duration of experiment
Gardner and Allen, 1939	68 mice	C3H	F	3.3 to 50 micrograms in sesame oil weekly	S.C.	38[1]	---	Avg. of 208 to 384 days
	35 mice	CBA	F	8.3 to 33.3 micrograms in sesame oil weekly	S.C.	14[2]	---	Avg. of 94 to 523 days
	30 mice	C_{12} I	F	8.3 to 16.6 micrograms in sesame oil weekly	S.C.	1 sarc.[3]	---	Avg. of 147 to 363 days
	15 mice	A	F	16.6 micrograms in sesame oil weekly	S.C.	2[1]	---	Avg. of 220 days
	21 mice	C57	F	8.3 to 50 micrograms in sesame oil weekly	S.C.	0	High mortality	Avg. of 181 days
	10 mice	JK	F	--do--	S.C.	0	---	334 days
	4 mice	F	F	50 to 100 micrograms in sesame oil weekly	S.C.	0	All dead in 87 days	87 days
Guercio, 1939	Rats	Stock	F, normal and castr.	At least 500 to 1,000 i.u. weekly[4]	---	0	Over 130 alive at 6 mos.	2 years
	Mice	Stock	--do--	At least 200 to 300 i.u. every 3 days[4]	---	0	Over 130 alive at 6 mos.	2 years
Koref et al., 1939	9 guinea pigs	---	M	80 micrograms in olive oil thrice weekly	S.C.	Tumors[5]	---	69-141 days
	--do--	---	M, castr.	--do--	S.C.	--do--	---	--do--
	18 guinea pigs	---	F, normal and castr.	--do--	S.C.	--do--	---	64-142 days
Landauer et al., 1939	15 fowls	---	M	1,700-30,000 i.u. daily	In	0	---	Over 4 mos.
Lipschütz, 1939a	Guinea pigs	---	F, castr.	5-10 micrograms	S.C.	Tumors[6]	---	90 days
	--do--	---	--do--	80 micrograms	S.C.	Tumors[7]	---	4 mos.
	--do--	---	--do--	40 micrograms	S.C.	Tumors[8]	---	--do--
	1 guinea pig	---	--do--	80 micrograms	S.C.	Tumors[9]	---	4 mos.
	--do--	---	--do--	20 micrograms	S.C.	--do--	---	7 mos.
	--do--	---	--do--	--do--	S.C.	--do--	---	11 mos.
	--do--	---	--do--	80 micrograms	S.C.	--do--	---	6 mos.
	--do--	---	--do--	80 micrograms thrice weekly	S.C.	Tumors[10]	---	68 days
	--do--	---	F	--do--	S.C.	Tumors[11]	---	83 days
	--do--	---	F, castr.	--do--	S.C.	--do--	---	6 mos.

1. Mammary carcinomas; also one lymphosarcoma and one cervical cancer.
2. Mammary carcinomas; also 2 lymphosarcomas.
3. Also 2 mammary carcinomas and 3 lymphosarcomas.
4. One animal also received cautery on the mammary gland, with no tumors developing.
5. Of mesentery, spleen, uterus, stomach, liver, etc.
6. Uterine and mesometrial.
7. Of the uterus.
8. Fibromyoma of uterus.
9. Uterine fibroma.
10. Apical myoma.
11. Uterine and extra-uterine tumors.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
				1094.--ESTRADIOL BENZOATE (Continued) 				
Lipschütz, 1939a (Continued)	1 guinea pig	---	F	80 micrograms thrice weekly	S.C.	Tumors[1]	---	4 mos.
	--do--	---	F, castr.	--do--	S.C.	Tumors[2]	---	9 mos.
Lipschütz, 1939b	5 guinea pigs	---	F	1 microgram thrice weekly	S.C.	0	---	3 mos.
	5 guinea pigs	---	F	5 micrograms thrice weekly	S.C.	5[3]	---	--do--
	4 guinea pigs	---	F	10 micrograms thrice weekly	S.C.	3[3]	---	--do--
	2 guinea pigs	---	F	20 micrograms thrice weekly	S.C.	2[3]	---	4 mos.
	17 guinea pigs	---	F	40 micrograms thrice weekly	S.C.	10[3]	---	3-4 mos.
	44 guinea pigs	---	F	80 micrograms thrice weekly	S.C.	43[3]	---	2 to 5 mos.
	6 guinea pigs	---	F	250 micrograms thrice weekly	S.C.	6[3]	---	2 mos.
Lipschütz et al., 1939a	3 guinea pigs	---	F, castr.	20 to 40 micrograms thrice weekly	S.C.	2[4]	---	At least 8 mos.
Lipschütz et al., 1939b	5 guinea pigs	---	F, castr.	80 micrograms in olive oil thrice weekly	S.C.	5[3]	---	90 days
	--do--	---	--do--	--do--[5]	S.C.	1[6]	---	--do--
Lipschütz et al., 1939c	36 guinea pigs	---	--do--	80 micrograms thrice weekly	S.C.	Tumors[7]	---	56-141 days
	35 guinea pigs	---	F	--do--	S.C.	--do--	---	64-142 days
Lipschütz et al., 1939e	8 guinea pigs	---	--do--	0.12 mg. weekly	S.C.	4[6]	---	84-120 days
Loeb et al., 1939	Mice	Inbred	F	1 to 30 r.u. in oil	---	0	---	Long period
	--do--	--do--	F	50 r.u. in oil daily	---	0	---	--do--
	--do--	--do--	F	100 or more r.u. in oil once or twice weekly	---	0	---	At least 8-32 weeks
Nelson, 1939	Guinea pigs	---	F	80-130 r.u. in oil daily	---	15[8]	---	3 to 14 mos.
Ruz Orrego, 1939	6 guinea pigs	---	F, castr.	49 micrograms thrice weekly	S.C.	Tumors[9]	---	102-122 days

1. Of abdominal wall.
2. Uterine and of abdominal wall.
3. Uterine and extra-uterine tumors.
4. Adenomatous and precancerous tumors of the endometrium; also 3 uterine fibromyomas which regressed spontaneously.
5. After 30 days 12 mgm. of progesterone in olive oil three times weekly.
6. Of the uterus.
7. Uterine visceral and splenic.
8. Malignancy questionable.
9. Both uterine and extra-uterine; also adenomatous polyps.

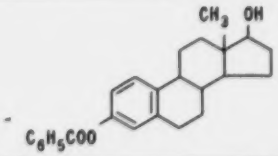
1094.--ESTRADIOL BENZOATE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Silberberg and Silberberg, 1939	24 guinea pigs	---	M & F	20 r.u. in saline 6 times weekly	I.P.	0	---	7 to 60 days
	--do--	---	--do--	250 r.u. in oil twice weekly	S.C.	0	---	--do--
Sutro and Pomerantz, 1939b	8 guinea pigs	---	M, castr.	12,000 to 60,000 r.u. in sesame oil, total dose	S.C.	0	---	28 to 80 days
Tislowitz, 1939b	5 mice	Albino	M, castr.	20 micrograms in olive oil, 4 injections	Inj.	0	---	35 days
	--do--	--do--	--do--	100 micrograms in olive oil, 4 injections	--do--	0	---	--do--
Di Paola, 1939	20 rats	---	Castr.	0.5-20 i.u. daily in oil	Inj.	0	---	90 days
Burns and Schenken, 1940	20 mice	C3H	M	3000 r.u. (total dose) in sesame oil, over 3 days	Inj.	0	---	Over 13.5 mos.
	11 mice	--do--	M	100 r.u. in sesame oil weekly for over 4 weeks	--do--	0	---	Over 11 mos.
	20 mice	--do--	M	100 r.u. in sesame oil weekly over 8 weeks	--do--	3[1]	---	Over 9 mos.
	14 mice	--do--	M	100 r.u. in sesame oil weekly over 12 weeks	--do--	1[1]	---	Over 10 mos.
	19 mice	--do--	M	100 r.u. in sesame oil weekly over 16 weeks	--do--	11[1]	---	Over 8.7 mos.
	--do--	--do--	M	100 r.u. in sesame oil weekly over 20 weeks	--do--	9[1]	---	Over 9.8 mos.
	--do--	--do--	M	100 r.u. in sesame oil weekly during life	--do--	10[1]	---	---
Costa, 1940	22 guinea pigs	---	F, castr.	80-250 micrograms in olive oil thrice weekly	Back	18[2]	---	83 days
	15 guinea pigs	---	F	--do--	--do--	0	---	--do--
	18 guinea pigs	---	F	80 micrograms in olive oil thrice weekly	Back	2[3]	---	83 days
Ely and Phillips, 1940	16 rats	Douredoure	F	16.5 micrograms 3-15 times	I.M. or S.C.	0[4]	---	31-50 days
Gardner, 1940	30 mice	F_1 hybrids, C57 and CBA	---	16.6 or 50 micrograms weekly	S.C.	Tumors[5]	---	555 days
Gardner et al., 1940	16 mice	C3H	---	33.3 micrograms in sesame oil weekly	S.C.	1[6]	13 alive at 150 days	504 days
	25 mice	--do--		33.3 micrograms in sesame oil monthly	S.C.	1[7]	19 alive at 150 days	645 days
	12 mice	--do--	---	16.6 micrograms in sesame oil monthly	S.C.	1[7]	12 alive at 150 days	576 days
	6 mice	--do--	---	16.6 micrograms in sesame oil every 3 weeks	S.C.	0[8]	6 alive at 150 days	572 days
	10 mice	--do--	---	16.6 micrograms in sesame oil every 2 weeks	S.C.	0[8]	10 alive at 150 days	479 days

1. Mammary.
2. Abdominal.
3. "Tumoral reaction."
4. One ovarian tumor.
5. Of mammary gland or pituitary in most.
6. Lymphoid; leukemia in one male.
7. Lymphoid.
8. In these two groups 10 died of mammary tumors.

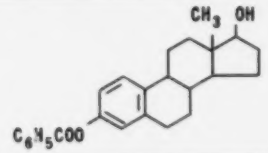
1094.--ESTRADIOL BENZOATE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Gardner et al., 1940 (Continued)	13 mice	C3H	---	8.3 micrograms in sesame oil weekly	S.C.	1[1]	13 alive at 150 days	528 days
	17 mice	--do--	---	16.6 micrograms in sesame oil weekly	S.C.	2[1]	17 alive at 150 days	392 days
	12 mice	--do--	---	33.3 micrograms in sesame oil twice weekly 6 times	S.C.	0	12 alive at 150 days	284 days
	6 mice	--do--	---	33.3 micrograms in sesame oil thrice weekly for 3 weeks	S.C.	0	6 alive at 150 days	509 days
	9 mice	--do--	---	3.3 micrograms in sesame oil weekly	S.C.	0	9 alive at 150 days	299 days
	12 mice	--do--	---	0.33 micrograms in sesame oil weekly	S.C.	---	12 alive at 150 days	567 days
Gardner and De Vita, 1940	7 dogs	Fox terrier, pure bred	M & F	133.3 microgram - 7mg. in sesame oil weekly	S.C.	0[2]	---	22 mos.
Gardner and Strong, 1940	75 mice	C57	M & F	8.3-50 micrograms in sesame oil weekly	S.C.	2[3]	---	345 days
Geist et al., 1940	5 human beings	---	F	15-25 mg. pellets	S.C.	0	---	23-238 days
Grumbrecht and Loeser, 1940	12 rats	---	F	1 mg. in sesame oil daily	S.C.	0	---	190 days
Hooker et al., 1940	Mice	A	M	0.05 mg. in sesame oil weekly	S.C.	1[4]	---	264 days
Huff, 1940	24 rats	---	F	1 and 2 mg. daily for 14-50 days	S.C.	0	---	56 days
	17 rats	---	F	0.2-2 mg. daily for 13-70 days	P.O.	0	---	83 days
Jones, 1940	30 mice	A	F, castr.	50 r.u. in olive oil weekly	S.C.	9[5]	25 alive at 226 days	49 weeks
	45 mice	A	M	--do--	--do--	0	---	--do--
	20 mice	A	F	--do--	--do--	3[6]	---	--do--
Lipschütz, 1940	Guinea pigs	---	F	20 micrograms 47 times	Inj.	Tumors[7]	---	4 mos.
	--do--	---	F	20 or more micrograms repeated 2-3 weeks apart	--do--	0	---	1 year
Lipschütz et al., 1940	3 guinea pigs	---	F, castr.	0.1 micrograms in olive oil thrice weekly	S.C.	0	---	85 days
	5 guinea pigs	---	F, castr.	1.0 micrograms in olive oil thrice weekly	S.C.	0	---	84 days
Murillo Costa, 1940	73 guinea pigs	---	F, normal and castr.	80 or 250 micrograms in olive oil thrice weekly	S.C.	0	---	31-70 days

1. Lymphoid.
2. Hair growth studied.
3. Hypophyseal adenoma.
4. Of the testes in 8 mos. Metastases to lymph nodes.
5. Mammary; first at 226 days.
6. Mammary.
7. Uterine.

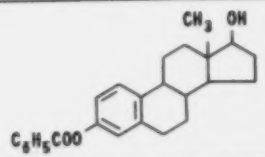
1094.--ESTRADIOL BENZOATE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Pfeiffer et al., 1940	56 mice	C57 and NH hybrids	M	16.6 micrograms in sesame oil weekly for 4 weeks	S.C.	0	---	30 days
Sammartino and Arenas, 1940	Dogs	---	F	20-300 i.u. daily	Inj.	0	---	---
	Dogs	---	F, castr.	200-5000 i.u. daily	Inj.	0	---	15-87 days
Sammartino and Gandolfo Herrara, 1940[1]	92 guinea pigs	---	M & F, normal and castr.	80-1600 micrograms in sesame oil thrice weekly	S.C.	31[2]	---	176 days
Suntzeff et al., 1940	5 mice	D, C57, and AKA	M	20 r.u. in water 6 times weekly	S.C.	0	---	16.5 mos.
	6 mice	A, D, C57 and AKA	M & F	100 r.u. in oil weekly	S.C.	0	---	--do--
Sutro, 1940	66 mice	C3H and stock	--do--	150-1000 r.u. in sesame oil weekly	S.C.	0[3]	---	22 weeks
Vargas, Jr. and Chaume, 1940	Guinea pigs	---	M & F, normal and castr.[4]	80 micrograms in oil thrice weekly	S.C.	Tumors[5]	---	At least 84 days
Walter et al., 1940	6 patients	---	F	15-25 mg. pellets	S.C.	0	---	Ca. 1 year
Wentworth et al., 1940	11 mice	---	M & F	0.10-0.73 mg. (total dose) in sesame oil	S.C.	0	---	At least 298 days
Allen and Gardner, 1941	53 mice[6]	C57 Females, CBA males, hybrids	M & F	16.6 or 50 micrograms weekly	S.C.	15[7]	24 females alive at 1 year	---
	52 mice[6]	CBA females and C57 males, hybrids	M & F	--do--	--do--	10[7]	20 females alive at 1 year	---
Biskind, 1941a	15 rats	---	F	Pellets, 1.1-1.8 mg.	S.C., spleen	0	---	80 days
Bittner, 1941	173 mice	Pure strains and hybrids[8]	---	Pellets (avg. wt. 1.5-2 mg.)	S.C.	9[9]	---	16 mos.
Bolliger and Canny, 1941	2 phalangers[10]	---	M & F	5 i.u. weekly	Inj.	0	---	9 weeks

1. Also in Rev. sud-am. de endocrinol., 24, 24-25, 1941). (Abstr. in Rev. méd. latino-am. 25, 976-997 (1940)).
2. Abdominal.
3. Skeletal changes studied.
4. Some splenectomized.
5. Abdominal fibromas.
6. Same animals as in Gardner, 1941b.
7. Of the cervix in over one year (squamous cell carcinoma).
8. Foster nursed by high and low cancer strain females.
9. Breast cancer.
10. "Possums."

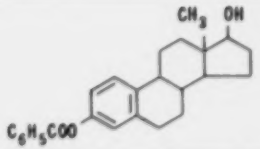
1094.--ESTRADIOL BENZOATE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Cleveland et al., 1941	6 monkeys	Macaque	F, castr.	2500 and 5000 r.u. in oil daily	S.C.	0	---	3 mos.
Day and Foltis, 1941	Rats	---	M & F	In sesame oil twice weekly	S.C.	0	---	125 days
Dingemanse and Tyslowitz, 1941	2 dogs[1]	---	F	5 mg. daily	S.C.	0	---	32 and 44 days
Dunato, 1941	9 rats	---	---	400 i.b.u. (0.04 mg.) in sesame oil daily	---	0	---	181 days
Gardner, 1941a	80 mice	C3H	M	0.01-0.05 mg. in sesame oil weekly	S.C.	31[2]	---	368 days
	4 dogs	Fox terriers	F	0.133 and 0.533 mg. in sesame oil weekly	S.C.	0	---	67-109 weeks
	6 monkeys	Rhesus	M & F	0.2-2 mg. weekly	S.C.	0	---	31-48 weeks
Gardner, 1941b	57 mice[3]	CBA females and C57 males, hybrids	M & F	16.6 or 50 micrograms weekly	S.C.	27[4]	---	671 days
	53 mice[3]	C57 females and CBA males, hybrids	M & F	--do--	--do--	35[5]	---	626 days
Gardner et al., 1941	Mice	CBA, C3H, C57, JK, & hybrids	---	16.6 to 50 micrograms in oil weekly	Inj.	0	---	At least 450 days
Lipschütz et al., 1941b	29 guinea pigs	---	F, castr.	5 or 10 micrograms[6] thrice weekly	S.C.	6[7]	---	3 mos.
Lipschütz et al., 1941d	6 guinea pigs	---	F, castr.	20 micrograms thrice weekly	S.C.	6[7]	---	113-312 days
	--do--	---	--do--	20 micrograms thrice weekly every other week	S.C.	0	---	365 days
Lipschütz and Vargas, Jr., 1941b	21 guinea pigs	---	F, castr.	80 micrograms in oil thrice weekly	S.C.	Tumors[7]	---	3 mos.
Lipschütz and Vargas, Jr., 1941c	Guinea pigs	---	--do--	0.1 to 1 microgram thrice weekly for 6-16 weeks	Inj.	0[7]	---	At least 16 weeks
Lipschütz and Vargas, Jr., 1941d	20 guinea pigs	---	F, castr.	40-80 micrograms thrice weekly	S.C.	20[7]	---	30-93 days
Ludden et al., 1941a	3 rats	Wistar	M	0.04 mg. in sesame oil daily	S.C.	0	---	42 days

1. Hysterectomized.
2. Mammary.
3. Some animals as in Allen and Gardner, 1941.
4. Pituitary tumors, incidence greater in males; also mammary carcinomas.
5. Pituitary tumors, incidence greater in males.
6. Calculated as Estradiol.
7. Uterine and other abdominal fibroids.

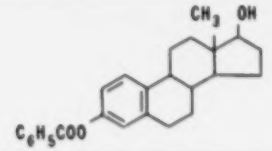
1094.--ESTRADIOL BENZOATE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Mark and Biskind, 1941	4 rats	---	F	Pellets, 2.7-3.7 mg.	S.C.	1[1]	---	244 days
Perloff and Kurzrok, 1941	12 guinea pigs	---	F	Ca. 5 mg. as pellets	Uterine horn	9[2]	---	52-150 days
	5 guinea pigs[3]	---	F	10,000 r.u. every 20 days, 6 times	S.C.	0	---	150 days
Shimkin and White, 1941	12 mice	A and C3H	M	Cholesterol pellets 25-100%, 5.2-5.7 mg.	S.C.	0	---	70 days
Tyslowitz and Dingemanse,[5] 1941	4 dogs	---	F	1 or 5 mg. daily	Inj.	0	---	Ca. 90 days
	Dogs	---	---	1 mg. daily	Inj.	0	---	9 mos.
Woodruff, 1941	9 guinea pigs	---	F[4]	50 mg. pellet	S.C.	9[5]	---	105-135 days
	5 guinea pigs	---	M	25 or 50 mg. pellet	S.C.	1[5]	---	90-148 days
del Castillo and di Paola, 1942	20 rats	---	F, castr.	0.5-20 I.B.U. in sesame oil daily	S.C.	0	---	90 days
	8 rats	---	--do--[6]	0.5-1.0 I.B.U. in sesame oil daily	S.C.	0	---	90 days
	6 rats	---	--do--[7]	1 I.B.U. in sesame oil daily	S.C.	0	---	At least 40 days
	--do--	---	--do--	0.5 and 1 I.B.U. in sesame oil daily	S.C.	0	---	At least 42 days
	8 rats	---	--do--[7]	1 I.B.U. in sesame oil daily	S.C.	0	---	At least 53 days
	4 rats	---	--do--[7]	--do--	S.C.	0	---	At least 35 days
	12 rats	---	--do--[8]	--do--	S.C.	0	---	43 days
Forbes, 1942	6 rats	---	M & F	Pellets	S.C.	0	---	At least 415 days
Geschickter and Byrnes, 1942	Rats	---	---	5 micrograms in oil daily	Inj.	Tumors[9]	---	At least 120 days
	70 rats	---	---	5-200 micrograms in oil daily	--do--	45[9]	---	At least 120 days
	22 rats	---	M & F	100 micrograms daily	Inj.	15	---	--do--
	1 rat	---	F	100 mg. daily	--do--	Tumors[10]	---	At least 690 days

1. Mammary adenocarcinoma.
2. Fibromyomatous.
3. Silk sutures introduced into the uterine peritoneum.
4. Both ovaries and uterus removed.
5. Abdominal; majority appeared to be fibromas.
6. Some adrenalectomized.
7. Adrenalectomized.
8. Some hypophysectomized.
9. Mammary cancer.
10. Lymphosarcoma of spleen, breast cancer, and fibroadenoma.

1094.--ESTRADIOL BENZOATE (Continued)

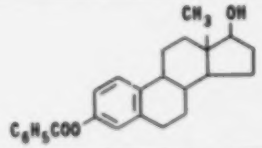


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Hooker and Pfeiffer, 1942	9 mice	A	M	16.6 micrograms in sesame oil weekly	Inj.	3[1]	7 alive at 8 mos.	Over 8 mos.
	40 mice	A	M	50 micrograms in sesame oil weekly	--do--	7[1]	17 alive at 8 mos.	--do--
Sutro and Pomerantz, 1942	5 dogs	Mongrel	M & F	10,000-20,000 r.u. in sesame oil weekly	S.C.	0[2]	---	5-7½ mos.
Carrasco, 1943	7 guinea pigs	---	F	20.2-32.4 mg. pellet. 1.5-1.9 mg. absorbed	S.C.	Tumors[3]	---	70 days
	5 guinea pigs	---	F	19.4-31.4 absorbed from pellet	Ear	--do--	---	--do--
Jones, 1943	25 mice	C3H	M	50 r.u. in olive oil weekly for 44 weeks	S.C.	22[4]	---	At least 10 mos.
	--do--	A	M	--do--	S.C.	1[4]	---	At least 20 mos.
Schenken and Burns, 1943	69 mice	C3H	M & F	0.0165 mg. in sesame oil weekly for 3-57 weeks	S.C.	19[5]	---	Over 57 weeks
Chevrel-Bodin and Cormier, 1944	93 rabbits	---	---	1 mg. in 1 cc. oil solution	S.C.	Tumors	---	---
Crossen and Loeb, 1944	16 mice	CBA,C57,AKA	F	100-200 r.u. weekly	S.C.	--do--	---	2-7 mos.
Gardner and Dougherty, 1944	788 mice	C3H, A, CBA, C57, J.K. and PM	M & F	16.6-25 mg. in sesame oil weekly	S.C.	Tumors[6]	---	---
Gardner et al., 1944	71 mice	C3H	---	10-50 micrograms in sesame oil weekly	S.C.	8[6]	---	---
Hamburger, 1944b	1 monkey	Rhesus	M	0.2 mg. in arachis oil daily	S.C.	0	---	1 year
Jacobson, 1944	65 mice	White	M & F	16 micrograms in sesame oil weekly	I.M.	0	---	At least 56 weeks
Landauer and Zondek, 1944	Fowls	White Leghorn	M	Repeated inj.	Inj.	0	---	At least 42 weeks
	Ducks	Pekin and Mallard	M	--do--	--do--	0	---	--do--
Lippman and Saunders, 1944	24 rats	---	F	125 i.u. in sesame oil	S.C.	0	---	At least 6 weeks

1. Of the testes. Also lung tumors.
2. Adenomas of the cortices of the adrenal glands.
3. Abdominal.
4. Mammary.
5. Of the liver; all in males.
6. Lymphoid.

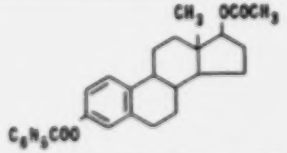
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

1094.--ESTRADIOL BENZOATE (Continued)



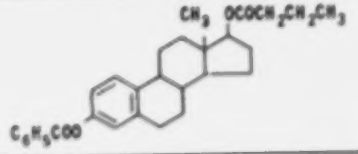
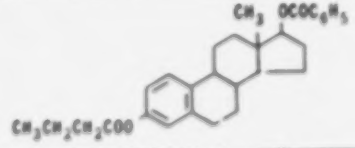
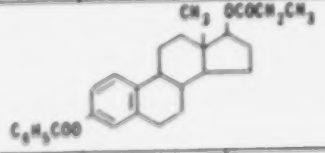
Lipschütz and Carrasco, 1944	7 guinea pigs	---	F, castr.	20.2-32.4 mg. tablet	S.C.	Many[1]	---	70 days
	5 guinea pigs	---	--do--	19.4-31.4 mg. tablet	Liver	--do--	---	--do--
Loeb et al., 1944	34 mice	C3H	M & F	100 r.u.	S.C.	6[2]	---	At least 5 mos.
	44 mice	D	--do--	--do--	--do--	7[2]	---	--do--
Vazquez-Lopez, 1944	6 hamsters	---	M & F	10 mg. tablets	S.C.	3[3]	---	327 days
Silberberg, M. and Silberberg, 1945b	104 mice	D	M & F	200 r.u. in sesame oil weekly for 5 mos.	S.C.	0	---	At least 5 mos.
	154 mice	--do--	--do--	--do--	--do--	7[4]	---	--do--
Valle and Leal Prado, 1946	5 dogs	Fox terrier	M, castr.	27-32 mg.	S.C.	0	All killed	8-10 mos.
	2 dogs	--do--	F	4-35 mg.	S.C.	0	--do--	--do--
Heller and Jungck, 1947	Rats	---	F	0.5 to 5 micrograms daily[5]	S.C.	0	---	At least 59 days
	--do--	---	---	0.05-0.25 micrograms daily	S.C.	0	---	At least 57 days
Kirby, 1947	6 rats	Alstar	F	10 mg. in pellets	S.C.	2[6]	--	348-373 days
Pfeiffer, 1947	6 birds	English Sparrow	M	5.0 micrograms daily for two weeks	I.M.	0	---	Ca. 80 days

1095.--ESTRADIOL-3-BENZOATE-17-ACETATE



Wiesner et al., 1958:	Rats	---	F, castr.	20 or 50 micrograms (total dose) in sesame oil	S.C.	0	---	Up to 83 days
	--do--	---	F	50 micrograms (total dose) in sesame oil	S.C.	0	---	30 days

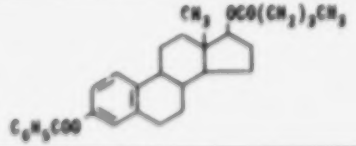
1. Abdominal fibroids.
2. Mammary carcinoma.
3. One pituitary tumor; 2 carcinomas of the epididymis.
4. Lymphosarcoma.
5. Effect on ovarian growth.
6. One mammary; one lung carcinoma.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1096.--ESTRADIOL-3-BENZOATE-17-α-BUTYRATE 								
Mieschor et al., 1950c	Rats	---	F, castr.	15 to 50 micrograms (total dose) in sesame oil	S.C.	0	---	Up to 120 days
	--do--	---	F	50 micrograms (total dose) in sesame oil	S.C.	0	---	30 days
	--do--	---	F, castr.	--do--	S.C.	0	---	50 days
Korenchevsky et al., 1959a	15 rats	---	--do--	6 micrograms in sesame oil 4 times weekly for 5 weeks	Inj.	0	---	21 to 73 days
	18 rats	---	--do--	90 micrograms in sesame oil weekly for 5 weeks	Inj.	0	---	21 to 127 days
	4 rats	---	--do--	120 micrograms in sesame oil 5 times weekly for one week	Inj.	0	---	19 weeks
Korenchevsky and Hall, 1960	6 rats	---	F, castr.	0.09 mg. weekly	Inj.	0	---	55-146 days
	12 rats	---	--do--	--do--	--do--	0	---	--do--
	5 rats	---	F	--do--	--do--	0	---	--do--
1097.--ESTRADIOL-17-BENZOATE-3-α-BUTYRATE 								
Lipschütz et al., 1940	9 guinea pigs	---	F, castr.	0.1 micrograms in olive oil 5 times weekly	S.C.	0	---	104 days
	--do--	---	--do--	1.0 micrograms in olive oil thrice weekly	S.C.	0	---	97 days
1098.--ESTRADIOL-BENZOATE-BUTYRATE[1]								
Nissim et al., 1940	Mice	---	F	12.5 micrograms in oil twice daily for 2 days	S.C.	0	---	Over 120 days
1099.--ESTRADIOL-3-BENZOATE-17-PROPIONATE 								
Mieschor et al., 1950c	Rats	---	F, castr.	20-60 micrograms (total dose) in sesame oil	S.C.	0	---	100 days
	--do--	---	F	90 micrograms (total dose) in sesame oil	S.C.	0	---	30 days

1. Number not stated.

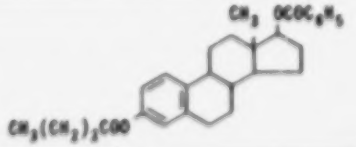
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

1100.--ESTRADIOL-3-BENZOATE-17-α-VALERATE



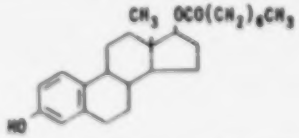
Mieschor et al., 1958c	Rats	---	F, castr.	20-50 micrograms (total dose) in sesame oil	S.C.	0	---	Up to 140 days
	--do--	---	F	50 micrograms (total dose) in sesame oil	S.C.	0	---	30 days

1101.--ESTRADIOL-3-α-BUTYRATE-17-BENZOATE



Mieschor et al., 1958c	Rats	---	F, castr.	50 micrograms (total dose) in sesame oil	S.C.	0	---	Up to 68 days
	--do--	---	F	--do--	S.C.	0	---	30 days
	--do--	---	F, castr.	--do--	S.C.	0	---	50 days
Jedlicka et al., 1959	2 guinea pigs	---	--do--	80 micrograms in olive oil 5 times weekly	S.C.	2[1]	---	87 days
	5 guinea pigs	---	M, castr.	--do--	S.C.	5[2]	---	87 to 104 days
	--do--	---	M	--do--	S.C.	5[2]	---	--do--

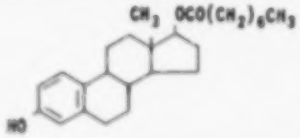
1102.--ESTRADIOL-17-CAPRYLATE



Jedlicka et al., 1959	4 guinea pigs	---	F, castr.	10 micrograms in olive oil thrice weekly	S.C.	4[3]	---	90 days
	5 guinea pigs	---	--do--	80 micrograms in olive oil thrice weekly	S.C.	5[3]	---	--do--
	--do--	---	M	--do--	S.C.	5[2]	---	101-105 days
	5 guinea pigs	---	M, castr.	--do--	S.C.	--do--	---	--do--
Egaña et al., 1941	62 rats	---	M & F, normal and castr.	2-80 micrograms in olive oil thrice weekly	Inj.	1[4]	---	102 days

1. Extra-uterine, spleen and stomach tumors.
2. Of the spleen, etc.
3. Uterine and extra-uterine tumors.
4. Of the spleen.

1102.--ESTRADIOL-17-CAPRYLATE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Lipschütz et al., 1941a	11 rats	---	F, castr.	10 micrograms[1] thrice weekly	S.C.	0	---	90-100 days
	7 rats	---	--do--	20 micrograms[1] thrice weekly	--do--	0	---	--do--
	9 rats	---	F	--do--	--do--	0	---	--do--
	53 rats	---	M	2-80 micrograms[1] thrice weekly	--do--	0[2]	---	81-102 days
Lipschütz et al., 1941b	13 guinea pigs	---	F, castr.	5 or 10 micrograms[1] thrice weekly	S.C.	12[3]	---	3 mos.
Lipschütz et al., 1941e	17 guinea pigs	---	F, castr.	1 microgram[1] thrice weekly	S.C.	2[4]	---	3 mos.
	10 guinea pigs	---	--do--	2-5 micrograms[1] thrice weekly	S.C.	7[4]	---	--do--
Lipschütz and Vargas, Jr., 1941a	19 guinea pigs	---	F	19 mg. (avg.) tablet	S.C.	0	---	---
Lipschütz and Vargas, Jr., 1941c	Guinea pigs	---	F, castr.	0.1 to 1 microgram thrice weekly for 16 weeks	Inj.	0	---	At least 16 weeks
Cordeiro, 1942	14 guinea pigs	---	F, castr.	20-44 mg. in tablets, 3.82-6.08 mg. absorbed	S.C.	Tumors[5]	---	55-65 days
Sierra, 1942[6]	35 guinea pigs	---	F, castr.	250-5000 micrograms	Inj.	0	---	52-64 days
Carrasco, 1943	7 guinea pigs	---	F	1.5-1.8 mg. pellets absorbed	S.C.	Tumors[5]	---	70 days
	--do--	---	--do--	1.1-1.8 mg. pellets absorbed	Liver	Tumors[7]	---	--do--
Lipschütz and Carrasco, 1944	7 guinea pigs	---	F, castr.	18.8-27.0 mg. tablet	S.C.	Many[7]	---	70 days
	--do--	---	--do--	19.4-26.9 mg. tablet	Liver	--do--	---	--do--
Lipschütz and Grismali, 1944	11 guinea pigs	---	--do--	Tablet	S.C.	9[8]	---	---
Lipschütz and Acuña, 1944	9 guinea pigs	---	F, castr.	9.2-12.0 mg. tablet	Spleen	0	---	62 days

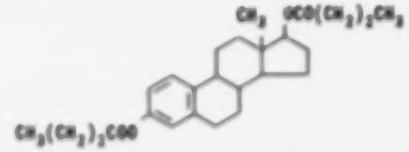
1103.--ESTRADIOL CAPRYLATE[10]

Lipschütz, 1939a	Guinea pigs	---	F, castr.	80 micrograms thrice weekly	S.C.	Tumors[11]	---	90 days

1. Calculated as Estradiol.
2. One with tumoral seeds on spleen.
3. Uterine and extra-genital fibroids.
4. Uterine fibroids.
5. 3 uterine and 5 apical.
6. All abdominal.
7. Uterine and extra-uterine tumors.
8. Abdominal fibroids.
9. Uterine and other abdominal fibroids.
10. Isomer not stated.
11. Of abdominal wall and uterus.

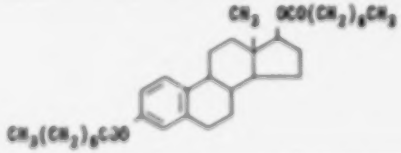
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1103.--ESTRADIOL CAPRYLATE[1] (Continued)								
Cheung, 1960	36 guinea pigs	---	M & F, normal and castr.	10 micrograms in olive oil thrice weekly	S.C.	Tumors[2]	---	90 days
Lipschütz et al., 1960	5 guinea pigs	---	F, castr.	0.1 micrograms in olive oil thrice weekly	S.C.	0[3]	---	103 days
	--do--	---	--do--	1.0 micrograms in olive oil thrice weekly	S.C.	0[4]	---	98 days
Szabo, 1961a	22 guinea pigs	---	M	80 micrograms in olive oil thrice weekly[5]	Inj.	Tumors[6]	---	74 days
Vargas, Jr. and Cheung, 1960	Guinea pigs	---	M & F, normal and castr.[7]	10 micrograms in oil thrice weekly	S.C.	--do--	---	At least 84 days
Pinzon, 1962	9 guinea pigs	---	F, castr.	0.5-0.7 mg. tablets absorbed	Inj.	0	---	62 days

1104.--ESTRADIOL DI-n-BUTYRATE



Wiesner et al., 1958c	Rats	---	F, castr.	20-50 micrograms (total dose) in sesame oil	S.C.	0	---	Up to 58 days
	--do--	---	F	50 micrograms (total dose) in sesame oil	S.C.	0	---	30 days

1105.--ESTRADIOL DICAPRATE

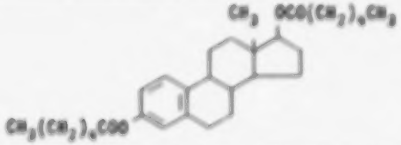


Wiesner, 1957b	Rats	---	F, castr.	50 micrograms during 2 days	S.C.	0	---	At least 136 days
Wiesner et al., 1958c	--do--	---	--do--	30-50 micrograms (total dose) in sesame oil	S.C.	0	---	Up to 139 days
	--do--	---	F	50 micrograms (total dose) in sesame oil	S.C.	0	---	30 days
	--do--	---	F, castr.	--do--	S.C.	0	---	60 days

1. Isomer not stated.
2. Genital and extra-genital fibromas.
3. Adenomatous polyps of the endometrium in two animals.
4. Adenomatous polyps in most animals.
5. Some also received α-tocopherol, subcutaneously.
6. Abdominal fibroids.
7. Some splenectomized.

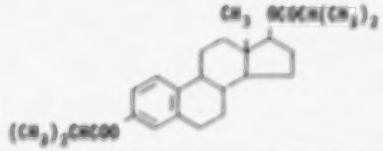
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

1106.--ESTRADIOL DI-n-HEXANOATE



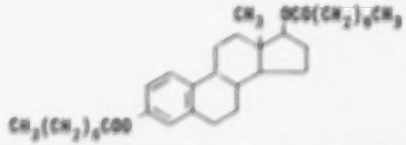
Wiescher et al., 1958c	Rats	---	F, castr.	20-50 micrograms (total dose) in sesame oil	S.C.	0	---	Up to 110 days
	--do--	---	F	50 micrograms (total dose) in sesame oil	S.C.	0	---	30 days

1107.--ESTRADIOL DI-ISOBUTYRATE



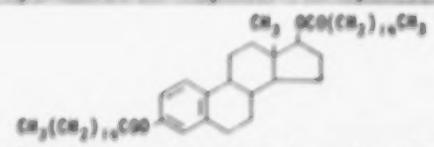
Wiescher et al., 1958c	Rats	---	F, castr.	20 or 50 micrograms (total dose) in sesame oil	S.C.	0	---	Up to 60 days
	--do--	---	F	50 micrograms (total dose) in sesame oil	S.C.	0	---	30 days

1108.--ESTRADIOL DI-n-OCTANOATE



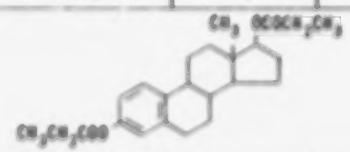
Wiescher et al., 1958c	Rats	---	F, castr.	15 or 50 micrograms (total dose) in sesame oil	S.C.	0	---	Up to 117 days
	--do--	---	F	50 micrograms (total dose) in sesame oil	S.C.	0	---	30 days

1109.--ESTRADIOL DIPALMITATE

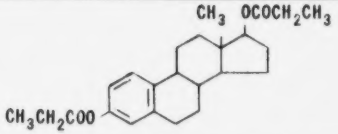


Wiescher et al., 1958c	Rats	---	F, castr.	30-50 micrograms (total dose) in sesame oil	S.C.	0	---	Up to 140 days
	--do--	---	F	50 micrograms (total dose) in sesame oil	S.C.	0	---	30 days

1110.--ESTRADIOL DIPROPIONATE

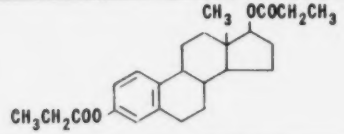


Wiescher, 1957b	Rats	---	F, castr.	50 micrograms during 2 days	S.C.	0	---	At least 50 days
Wiescher et al., 1957	--do--	---	F	50 micrograms	Inj.	0	---	2 mos.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1110.--ESTRADIOL DIPROPIONATE (Continued) 								
Miescher, 1938	Rats	---	F, castr.	20-50 micrograms (total dose)	S.C.	0	---	Ca. 55 days
Miescher et al., 1938c	--do--	---	--do--	20 or 50 micrograms (total dose) in sesame oil	S.C.	0	---	Up to 42 days
	--do--	---	F	50 micrograms (total dose) in sesame oil	S.C.	0	---	50 days
Bellolio, 1939	23 guinea pigs	---	F, castr.	0.1-80 micrograms in olive oil thrice weekly	Inj., back	6[1]	---	85-90 days
Gardner and Allen, 1939	6 mice	C3H	F	50 micrograms in sesame oil weekly	S.C.	3[2]	---	Avg. of 187 days
Geschickter, 1939b	Rats	---	---	100 micrograms in oil daily	Inj.	Tumors[3]	---	Over 185 days
Korenchevsky et al., 1939a	20 rats	---	F, castr.	6 micrograms in sesame oil thrice weekly	Inj.	0	---	21-31 days
	15 rats	---	--do--	30 micrograms in sesame oil thrice weekly	Inj.	0	---	--do--
Korenchevsky et al., 1939b	3 rats	---	--do--	6 micrograms in sesame oil thrice weekly	Inj.	0	---	Ca. 87 days
	5 rats	---	--do--	30 micrograms in sesame oil thrice weekly	Inj.	0	---	Ca. 87 days
	9 rats	---	--do--	0.2 mg. in sesame oil weekly	Inj.	0	---	Ca. 109 days
Korenchevsky et al., 1939c	4 rats	---	M, castr.	6 micrograms in sesame oil 3 times weekly	--do--	0	---	Ca. 105 days
	6 rats	---	--do--	30 micrograms in sesame oil thrice weekly	Inj.	0	---	--do--
Lipschutz, 1939a	Guinea pigs	---	F, castr.	80 micrograms thrice weekly	S.C.	Tumors[4]	---	90 days
Bonser and Robson, 1940	31 mice	RIII	M	50 micrograms in oil weekly	S.C.	9[5]	---	89 weeks
	26 mice	CBA	M	--do--	--do--	0	---	--do--
Gardner et al., 1940	12 mice	C3H	M & F	50 micrograms in sesame oil weekly	S.C.	7[6]	All alive at 150 days	300 days
Gardner and Strong, 1940	10 mice	C57	M & F	50 micrograms in sesame oil weekly	S.C.	0	---	Up to 92 days
Hall, 1940	8 rats	---	F, castr.	0.2 mg. weekly	Inj.	0	---	At least 87 days
Kochakian, 1940	Mice	dba	M & F	0.10 and 0.25 mg. in sesame oil daily	S.C.	0	---	At least 160 days
Korenchevsky and Hall, 1940	3 rats	---	F, castr.	0.18 mg. weekly	Inj.	0	---	53-146 days
	5 rats	---	--do--	0.090 mg. weekly	--do--	0	---	--do--
	9 rats	---	--do--	0.2 mg. weekly	--do--	0	---	--do--

1. 3 of spleen and 3 of uterus.
2. One mammary adenocarcinoma, 2 lymphosarcomas, 2 leukemias.
3. Mammary carcinoma in average time of 185 days.
4. Of abdominal wall and uterus.
5. Mammary carcinoma; first at 29 weeks.
6. Lymphoid.

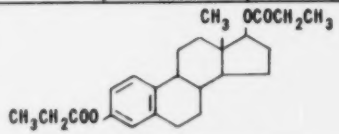
1110.--ESTRADIOL DIPROPIONATE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Lipschütz et al., 1940	2 Guinea pigs	---	F, castr.	0.1 micrograms in olive oil thrice weekly	S.C.	0	---	85 days
	5 guinea pigs	---	--do--	1.0 micrograms in olive oil thrice weekly	S.C.	0	---	--do--
Pfeiffer et al., 1940	19 mice	C57 & NH hybrids	M	50 micrograms in sesame oil weekly for 4 weeks	S.C.	0	---	30 days
Allen and Gardner, 1941	Mice	---	F	---	Inj.	Tumors[1]	---	---
Gardner, 1941a	17 mice	C3H	M	0.05 mg. in sesame oil weekly	S.C.	Tumors[2]	---	300 days
	1 monkey	Rhesus	F	6.0 mg. weekly	S.C.	0	---	26 weeks
Gardner et al., 1941	Mice	CBA, C3H, C57, JK, A & hybrids	---	16.6 to 50 micrograms in oil weekly	Inj.	0	---	At least 450 days
Korenchevsky, 1941	Rats	---	F, castr.	0.018 to 0.2 mg. weekly	Inj.	0	---	Ca. 3.5 mos.
Lipschütz et al., 1941b	28 guinea pigs	---	--do--	5 or 10 micrograms[3] thrice weekly	S.C.	10[4]	---	3 mos.
Lipschütz and Vargas, Jr., 1941a	16 guinea pigs	---	F	17 mg. (avg.) tablet[5]	S.C.	0	---	70 days
Lipschütz and Vargas, Jr., 1941c	Guinea pigs	---	F, castr.	0.1-1 microgram thrice weekly for 16 weeks	Inj.	0[6]	---	At least 16 weeks
Ludden et al., 1941b	9 rabbits	---	M & F	0.2 mg. in sesame oil daily for 1 week then thrice weekly	I.M.	0	---	14 weeks
Marine and Rosen, 1941	12 fowls	White leghorn	M, castr.	1 mg. weekly	Inj.	0[7]	---	6 mos.
Cordeiro, 1942	19 guinea pigs	---	F, castr.	2.6-10.5 mg. in tablets 0.28-2.35 absorbed	S.C.	8[8]	---	67 days
Eisen, 1942a	142 rats	Sherman	M & F	1-20[9] mg. in paraffin	S.C.	0[10]	---	27 mos.
Eisen, 1942b	234 rats	--do--	--do--	5 mg. in paraffin	S.C., I.M. or I.P.	0	---	318 days

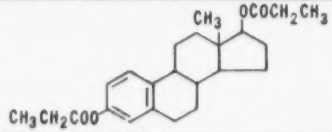
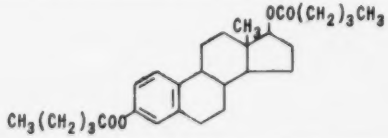
1. Cervical cancer.
2. Mammary.
3. Calculated as estradiol.
4. Uterine and other abdominal fibroids.
5. Rate of absorption studied.
6. Adenomatous polyps filling uterine cavity.
7. Lymphomatosis.
8. Abdominal.
9. M.P. 48°.
10. 2 mammary adenocarcinomas and one squamous-cell cancer of cervix. No metastases.

1110.--ESTRADIOL DIPROPIONATE (Continued)

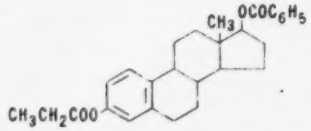
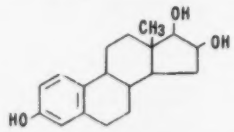


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Elqueta-Elqueta, 1942	5 guinea pigs	---	F, castr.	Tablets 11-54 micrograms absorbed daily	Intrathoracic	0[1]	---	91-93 days
	--do--	---	--do--	Tablets 39-44 micrograms absorbed daily	S.C.	2	---	95-127 days
Forbes, 1942	9 rats	---	M & F	Pellets	S.C.	0	---	At least 220 days
Geldres, 1942	18 guinea pigs	---	F, castr.	Pellets 1.4-4.5 mg. absorbed[2]	S.C.	Tumors[3]	---	73 days
	--do--	---	--do--	Pellets 1-4.5 mg. absorbed	S.C.	--do--	---	70 days
	13 guinea pigs	---	--do--	Pellets 1.4-3.8 mg. absorbed	S.C.	--do--	---	76 days
Geschickter and Byrnes, 1942	Rats	---	---	5 micrograms in oil daily	S.C.	Tumors[4]	---	At least 120 days
Ludden et al., 1942	9 rabbits	---	M & F	0.2 mg. thrice weekly	Inj.	0	---	100 days
Marx et al., 1942	110 guinea pigs	---	F, castr.	Large doses thrice weekly	Inj.	12[5]	12 alive at 4 mos.	4 mos.
Pinzon, 1942	13 guinea pigs	---	F, castr.	Pellets 0.4-1.2 mg. absorbed	Inj.	0	---	71 days
Robson and Schönberg, 1942	Mice	---	F, castr.	500 micrograms in oil daily	S.C.	0	---	At least 50 days
Simpson et al., 1942	6 rats	---	F	1 pellet (10 mg.) weekly for 6 weeks	S.C.	0	---	42 days
Abadi, 1943	52 guinea pigs	---	M	1.1-9.1 mg. pellets absorbed	S.C.	Tumors[6]	---	130-160 days
Ball and Cuthbertson, 1943	7 rats	---	M	0.1 mg. twice	S.C.	0	---	41 days
Cano, 1943	10 guinea pigs	---	F	4.3-12.5 mgm. in pellets. 3.4-10.7 mgm. absorbed	S.C.	Tumors[3]	---	198 days
Carrasco, 1943	--do--	---	F	0.8-1.5 mg. pellets absorbed	S.C.	--do--	---	71 days
	20 guinea pigs	---	F	1.4-2.6 mg. pellets absorbed	Liver	--do--	---	--do--
Riesco, 1943	6 guinea pigs	---	Castr.	5% in cholesterol, 0.37-0.79 micrograms daily	S.C.	0[6]	---	Ca. 8 mos.
	--do--	---	--do--	5% in cholesterol, 0.35-1.21 micrograms daily	S.C.	--do--	---	--do--

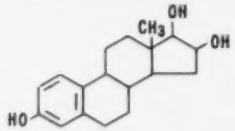
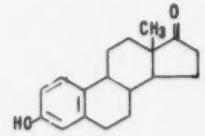
1. Only fibrosis.
2. With different diets.
3. Abdominal.
4. Mammary.
5. Uterine and extrauterine fibromyomas.
6. Mostly fibrosis.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1110.--ESTRADIOL DIPROPIONATE (Continued) 								
Gardner et al., 1944	180 mice	C3H	---	10-50 micrograms in sesame oil weekly	S.C.	36[1]	---	---
	55 mice	--do--	---	Pellets	S.C.	16[1]	---	---
Iglesias et al., 1944	12 guinea pigs	---	F, castr.	40% in cholesterol tablets[2]	S.C.	12[3]	---	108 days
Lipschütz and Acuña, 1944	13 guinea pigs	---	F, castr.	0.9-2.0 mg. tablets	Spleen	0	---	65 days
	6 guinea pigs	---	--do--	2.4-4.3 mg. tablets	S.C.	5[4]	---	68 days
Lipschütz and Carrasco, 1944	10 guinea pigs	---	F, castr.	1.4-2.2 mg. tablet	S.C.	Many[4]	---	70 days
	20 guinea pigs	---	--do--	2.5-5.3 mg. tablets	Liver	--do--	---	--do--
Lipschütz and Grismali, 1944	10 guinea pigs	---	--do--	Tablets	S.C.	9[4]	---	---
Poumeau-Delille and Fabiani, 1944	Guinea pigs	---	F	1 mg. daily, 20-28 days	---	0	---	At least 90 days
van Wagenen and Morse, 1944	11 monkeys	Rhesus	F	20-50 mg. in oil; also 10 mg. pellets	Intrauterine	0	---	At least 40 days
Lipschütz et al., 1945b	57 guinea pigs	---	M, castr.	Pellets	S.C.	19[5]	---	331 days
Plagge, 1946	12 rats	Albino Sprague-Dawley	---	0.1 or 0.2 mg.; 0.1 mg. in 0.1 cc. of sesame oil injected weekly	S.C.	0	---	10½ mos.
Gardner and Dougherty, 1944	18 mice	C3H, CBA, C57, JK, PM.	M & F	10 micrograms in sesame oil	S.C.	Tumors[1]	---	---
	50 mice	--do--	--do--	25 micrograms in sesame oil	S.C.	--do--	---	---
	114 mice	--do--	--do--	50 micrograms in sesame oil	S.C.	--do--	---	---
1111.--ESTRADIOL DI-n-VALERATE 								
Miescher et al., 1938c	Rats	---	F, castr.	15 to 50 micrograms (total dose) in sesame oil	S.C.	0	---	Up to 76 days
	--do--	---	F	50 micrograms (total dose) in sesame oil	S.C.	0	---	30 days

1. Lymphoid.
2. Other animals had also pellets of progesterone.
3. Uterine and other abdominal fibroids.
4. Abdominal fibroids.
5. Of utricular bed.

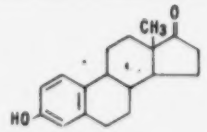
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors[1]	Survival	Duration of experiment
1112.--ESTRADIOL-3-PROPIONATE-17-BENZOATE 								
Miescher et al., 1938c	Rats	---	F, castr.	50 micrograms (total dose) in sesame oil	S.C.	0	---	Up to 51 days
	--do--	---	F	--do--	S.C.	0	---	30 days
1113.--ESTRIOL 								
Turner and Gomez, 1934	1 mouse	---	M	0.02% in dilute aqueous alkali, 0.05 cc. and 0.1 cc. daily	S.C.	0	---	51 days
	2 mice	---	M	0.02% in dilute aqueous alkali, 0.1 cc. daily	S.C.	0	---	40-90 days
Wade, 1934	Rats	---	M	0.65 to 32.5 micrograms daily	Inj.	0	---	113-242 days
	--do--	---	F	--do--	Inj.	0	---	143 to 316 days
Bachman et al., 1935	8 monkeys	Macaques	M & F, normal and castr.	10% in alcohol, 200 micrograms thrice daily; later 500 micrograms daily	---	0	---	12-110 days
Barry et al., 1935	5 mice	Stock	---	0.1% in alcohol twice weekly	Skin	0	3 alive at 6 mos.	236 days
Burrows, 1935a	--do--	---	---	0.01 to 0.1%[2] in benzene or alcohol twice weekly	Skin	0	---	---
Burrows, 1935c	Mice	---	M	0.1% in alcohol twice weekly	--do--	0	---	Over 50 days
Burrows, 1935d	--do--	---	---	In benzene	--do--	0	---	314 days
Burrows, 1936b	--do--	Stock	M	0.1% in alcohol twice weekly	Skin	0	---	Avg. of 197 days
Burrows, 1936c	6 mice	---	M	--do--	--do--	0	---	Avg. of 233 days
Gardner et al., 1936d	Mice	A	M & F	---	Inj.	0	---	125 days
Loeb et al., 1936	--do--	Old Buffalo	---	10 r.u. in water daily[2]	---	0[3]	---	At least 2 years

1. C.P. grade of substance used.
2. Followed by 30 r.u. of estrone daily for 6.5 mos.
3. In one female a carcinoma-like proliferation in the vagina, cervix and uterus was observed.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1113.--ESTRIOL (Continued) 								
Bachmann et al., 1937	5 mice	Stock	---	---[1]	Skin	0	3 alive at 6 mos.	311 days
Dessau, 1937	Guinea pigs	---	F, normal and castr.	7 micrograms[2] in oil daily	S.C.	0	---	90 days
Gardner, 1937b	19 mice	---	F	20 r.u. weekly	---	1[3]	---	---
Figelist, 1941	29 guinea pigs	---	F, castr.	In cylinder 0.5-3.9 mg. absorbed	S.C.	Tumors[4]	---	21-120 days
Forbes, 1942	8 rats	---	M & F	Pellets	S.C.	0	---	At least 93 days
Lipschütz et al., 1942a	17 guinea pigs	---	F, castr.	Pellets	S.C.	Tumors[5]	---	50-120 days
Mello, 1944	15 guinea pigs	---	F, castr.	20-43 mg. pellets	S.C.	Tumors[6]	---	90 days
Lipschütz et al., 1945a	51 guinea pigs	---	F	18-48 mg. pellets	Spleen	Tumors	---	At least 90 days
Mello, 1948	15 guinea pigs	---	F, castr.	3.4-13 mg. pellets absorbed	S.C.	Tumors[7]	---	91 days
1114.--ESTRONE 								
Laqueur et al., 1928	Guinea pigs	---	M, castr.	1-2 units daily	---	0	---	6 mos.
	1 monkey	---	F, castr.	870 m.u. over 1½ mos.	---	0	---	At least 1½ mos.
Goormaghtigh, 1929a	Mice	---	F, normal and castr.	12 to 100 r.u. daily[8]	Inj.	0	---	6 mos.
Goormaghtigh, 1929b	--do--	---	---	Repeated inj. for a prolonged time	Inj.	0	---	6 mos.

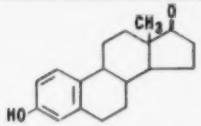
1. M.P. 280° corr.
2. Not completely free from other estrogens.
3. Mammary.
4. Abdominal; first at 30 days.
5. Uterine and non-genital.
6. Abdominal fibroids.
7. Abdominal.
8. Impure product used.

1114.--ESTRONE (Continued)



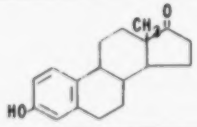
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Del Castillo and Calatroni, 1930	Rats	---	F, normal and castr.	0.1 to 0.2 units daily	Inj.	0	---	Several mos.
Goormaghtigh and Amerlinck, 1930	12 mice	---	---	6 r.u. daily	Inj.	Tumor[1]	---	9 mos.
Leonard et al., 1931	20 rats	---	F	2 r.u. in corn oil daily	Vagina	0	---	21-66 days
	8 rats	---	F	4 r.u. in corn oil daily, 20 inj.	Inj.	0	---	45 days
	9 rats	---	F	2 r.u. in corn oil daily	---	0	---	20 days
Lacassagne, 1932	10 mice	---	M, castr.	Weekly	Inj.	0	---	---
	5 mice	R3	M & F	0.06%[2] in oil, 0.05 cc. weekly	Inj.	3[3]	---	8 weeks
Spencer et al., 1932	13 rats	---	M	20 r.u. in olive oil	Inj.	0	---	5 mos.
	15 rats	---	F	--do--	--do--	0	---	--do--
Wolfe et al., 1932	24 guinea pigs	---	F, castr.	Varying doses over long period of time	---	0	---	---
	20 rats	---	--do--	--do--	---	0	---	---
Barnes et al., 1933	4 dogs	---	F	200 r.u. in oil daily	S.C.	0	---	3 weeks
Bialet-Laprida, 1933a	Rats	---	F	1 r.u. every 12 hours	Inj.	0	---	34 to 110 days
Bialet-Laprida, 1933b	10 rats	---	F	--do--	--do--	0	---	35 days
Bialet-Laprida, 1933c	--do--[4]	---	F	--do--	Inj.	0	---	30 days
Burrow et al., 1933	8 mice	---	M	0.3% in olive oil, 0.5 cc. 5 inj.	Inj.	0	---	10 weeks
	28 mice	---	M	0.3% in benzene twice weekly	Skin	0	---	--do--
	10 mice	---	F	--do--	--do--	0	---	--do--
Lacassagne, 1933b	5 mice	R3	M	Weekly[5]	Inj.	5[6]	---	189 days
	7 mice	--do--	F	--do--	Inj.	--do--	2 neg. alive at 208 days	208 days
	--do--	R2	M	--do--	Inj.	0	---	217 days
	6 mice	XVII	M	--do--	Inj.	1[6]	3 neg. alive at 338 days	338 days
	4 mice	--do--	F	--do--	Inj.	0	1 alive at 338 days	338 days
	2 mice	R4	M	--do--	Inj.	1[6]	1 neg. alive at 304 days	---
	3 mice	R4	F	--do--	Inj.	--do--	2 neg. alive at 465 days	465 days

1. Adenomatous formations of the mammary gland; first at 34 days.
2. Estrone benzoate may also have been used.
3. Mammary adenocarcinoma in males.
4. With one ovary removed.
5. Crude preparation of estrone used.
6. Mammary cancer.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
				1114.--ESTRONE (Continued) 				
Overholser and Allen, 1933	8 monkeys	Rhesus	F, normal and castr.	50-100 r.u. daily[1]	S.C.	2[2]	---	16-90 days
Werner and Collier, 1933a	5 human beings	---	F, castr.	200-400 r.u. daily	I.M.	0	---	3 mos.
Werner and Collier, 1933b	8 human beings	---	F, castr.	200-400 r.u. daily	I.M.	0	---	3 mos.
Burrows and Kennaway, 1934	10 mice	---	F	0.1% in benzene twice weekly	S.C.	0	3 died early	16 weeks
	Mice	---	M	--do--	S.C.	0	---	At least 162 days
	20 mice	---	M	0.01% in benzene twice weekly	S.C.	0	13 alive at 47 days	At least 47 days
Calatroni, 1934	12 rats	---	F	12 i.u. daily	S.C.	0	---	90 days
Gardner et al., 1934	15 mice	C3H	M	0.5 to 2.5 r.u. twice daily	S.C.	0	2 killed early	20 to 148 days
	--do--	A	M	--do--	S.C.	0	--do--	15 to 198 days
	--do--	CBA	M	--do--	S.C.	0	--do--	15-148 days
Geschickter et al., 1934	Monkeys	Rhesus & R. cebus	M	16 to 64 r.u. in corn oil daily	Inj.	0	---	6 weeks
Korenchevsky and Dennison, 1934	39 rats	---	M	60 to 180 i.u. in olive oil daily	S.C.	0	---	29 to 43 days
	73 rats	---	M, castr.	60 to 180 i.u. in olive oil or arachis oil daily	S.C.	0	---	7 to 43 days
Pierson, 1934	3 rabbits	---	F, castr.	With progesterone	Inj.	0	---	---
Tietze, 1934	Rabbits	---	F, castr.	10-14 m.u. daily	S.C.	0	---	16 weeks
	3 monkeys	Rhesus	F	Pellets, 32,000-38,000 m.u.	---	0	---	46 days
	1 monkey	--do--	F	72,000 m.u. (total dose)	I.M.	0	---	72 days
Wade, 1934	Rats	---	M	1.65 to 6.60 micrograms, daily inj.	Inj.	0	---	113 to 242 days
Barry et al., 1935	30 mice	Stock	---	0.1% in benzene twice weekly	Skin	0	7 alive at 6 mos., 1 alive at 1 year	372 days
	20 mice	Stock	M	0.01% in benzene	--do--	0	3 alive at 6 mos., 1 alive at 1 year	378 days

1. Seven animals received also cervical trauma, and 3 also injections of corpus luteum hormone.
2. Of the cervix.

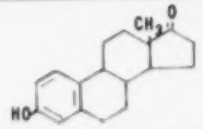
1114.--ESTRONE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Barry et al., 1935 (Continued)	20 mice	Stock	F	0.01% in benzene	Skin	0	18 alive at 6 mos., 5 alive at 422 days	422 days
	11 mice	Stock	M, castr.	--do--	--do--	0	10 alive at 6 mos., 6 alive at 391 days	391 days
Engle and Smith, 1935	4 monkeys	---	F, castr.	23,400 to 95,400 r.u. in corn oil, during 60-170 days	S.C. or I.M.	0	---	60-170 days
Burrows, 1935a	187 mice	---	---	0.01 or 0.1% in benzene or alcohol twice weekly	Skin	0[1]	---	---
Burrows, 1935b	130 mice	Stock	M, normal and castr.	0.01% in benzene twice weekly	Skin	2[2]	---	Over 291 days
Burrows, 1935c	Mice	---	--do--	--do--	Skin	2[3]	125 alive at 100 days	At least 419 days
Burrows, 1935d	--do--	---	---	In benzene	Skin	0[4]	---	---
Frazier and Mu, 1935	8 rabbits	---	M	20-60 r.u.[5] in olive oil daily	S.C.	0	---	Over 250 days
De Jongh and Kok, 1935	2 dogs	---	M	1,000 units in olive oil twice daily	S.C.	0	---	5.5 weeks
	3 dogs	---	---	400-1000 units in olive oil twice daily	S.C.	0	---	7 weeks
Lacassagne, 1935c	12 mice	R3	M	300 i.u. weekly	Inj.	11[6]	---	Ca. 16 mos.
	9 mice	R3	F	--do--	Inj.	7[6]	---	---
	10 mice	XVII and R4	M & F	--do--	Inj.	9[6]	---	16 mos.
Overholser and Allen, 1935	7 monkeys	Rhesus	F	50-360 r.u. daily[7]	S.C.	0	---	16 to 102 days
Selye et al., 1935a	8 rats	---	F	500 micrograms in oil daily	---	0	---	26 days
	6 rats	---	F	20 micrograms daily	---	0	---	20 days
	7 rats	---	F	100 micrograms in oil daily	---	0	---	30 days
	12 rats	---	F	500 micrograms in oil daily	---	0	---	4 weeks
Selye et al., 1935b	8 mice (?)	---	F, castr.	30 to 60 micrograms in oil daily	I.P.	0	---	10 weeks
Shumacker, Jr. and Lamont, 1935	6 rats	---	M & F	9 r.u. in corn oil daily	S.C.	0	---	67 days

1. Hyperplasia and metaplasia in prostate.
2. Mammary; in castrated mice, in 175 and 291 days. Animals in 291 days had also received applications of progesterone.
3. Mammary tumors in castrated animals. Also many cases of aveolar formations called "benign adenomata".
4. Of the pituitary in a male.
5. Impure product used.
6. Mammary adenocarcinoma.
7. All animals were traumatized, 4 received also injections of corpus luteum hormone.

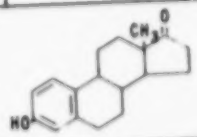
1114.--ESTRONE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Zuckerman and Morse, 1935	1 monkey	Mangabey	F	33,675 r.u. (total dose) during 53 days	---	0	---	53 days
Van Wagenen, 1935a	2 monkeys	---	M	5,000 and 6,000 r.u. resp. during 34 and 42 days	Inj.	0	---	34 and 42 days
Van Wagenen, 1935b	--do--	---	M	Application during 34 days	S.C.	0	---	34 days
Tansk and de Fremery, 1935	2 dogs	Fox terrier	F, castr.	500 I.u. per kg. body wt. in aq. soln. for 6½ mos.	S.C.	0	---	Ca. 7 mos.
Argüello, 1936	25 rats	---	M & F	12 to 40 I.u. in oil or water daily	Stomach	0	---	56 to 102 days
Bernard, 1936	18 rats	---	---	5 units every 5 days	Marrow of femur	0	---	5 mos.
Burrows, 1936a	679 mice	Stock	M & F	0.01% in benzene twice weekly	Skin	11	---	At least 483 days
Burrows, 1936b	Mice	Stock	M	--do--	--do--	3?	---	Avg. of 213 days
Burrows, 1936c	68 mice	---	M	--do--	--do--	0	---	390 days
Burrows et al., 1936	8 rats	Stock	---	0.05% in olive oil, 1 cc. weekly	S.C.	0	6 alive at 4 mos.	71 weeks
	5 rats	--do--	---	--do--	S.C.	0	2 alive at 4 mos.	48 weeks
	7 rats	--do--	---	In lard weekly	S.C.	1	All alive at 4 mos.	72 weeks
Cramer and Horning, 1936	Mice	Stock	M & F	0.01% in chloroform twice weekly	Skin	0	---	---
	--do--	D.-23	M & F	--do--	--do--	6	---	21 weeks
Crispolti, 1936	30 mice	---	M & F	10 m.u. twice weekly	---	0	17 alive at 9 mos.	9 mos.
Gardner et al., 1936c	5 mice	C3H	M	10 r.u. in aqueous soln., daily for 68-102 days then estrone benzoate (500 I.u. weekly)	S.C.	5 sarc.	---	273 days
	6 mice	A	M	--do--	S.C.	0	---	---
Gardner et al., 1936d	Mice	A	M & F	---	Inj.	0	---	125 days
	--do--	C3H	---	---	Inj.	1[4]	---	---
	5 mice	C3H	M	In aqueous soln., followed by estrone benzoate in oil	---	5 sarc.	---	---

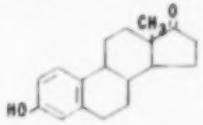
1. Mammary tumors in castrated animals. Also many cases of alveolar formations called "benign adenomata".
2. Mammary tumors in castrated animals. 2 had received progesterone.
3. Obtained from Dobrovolskaia-Zavadskaia.
4. Mammary.

1114.--ESTRONE (Continued)

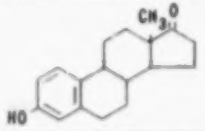


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Herold and Effkemann, 1936a	52 rats	---	M & F, normal and castr.	50-250 i.u. in oil daily	I.M.	0	---	17 to 56 days
					S.C.	0	---	17 to 85 days
Herold and Effkemann, 1936b	28 rats	---	M & F	50-1,000 i.u. daily	---	0[1]	---	At least 105 days
Hisaw and Lendrum, 1936	4 monkeys	---	F, castr.	1,079 to 8,240 r.u. during 22-105 days	I.P.	0	---	10 weeks
Kaufmann and Steinkamm, 1936	31 rats	---	F, castr.	30-60 micrograms in corn oil daily	I.P.	0	---	---
	18 rats	---	--do--	9 micrograms in corn oil daily	S.C.	0	---	30-358 days
	42 rats	---	--do--	9-60 micrograms in corn oil daily	---	0	---	2 mos.
Lyons and Penchars, 1936	12 guinea pigs[2]	---	M	1,800 r.u. in oil during each month	Inj.	0	---	20-45 days
Mac Donald, 1936	3 rabbits	---	F, castr.	50 r.u. daily[3]	Inj.	0	---	50 to 187 days
	7 rabbits	---	--do--	25-200 r.u. almost daily	Inj.	0	---	100 to 170 days
	2 rabbits	---	--do--	50 to 100 r.u., repeated injections	Uterus	0	---	At least 105 days
McEuen, 1936	11 rats	---	--do--	0.1% in corn oil, 0.05 to 1.25 cc.	S.C.	0	---	Over 132 days
	--do--	---	--do--	30 micrograms in corn oil daily	---	0	---	Over 134 days
	12 rats	---	M	in corn oil	S.C.	0	---	Over 100 days
	6 rats	---	F, castr.	0.1% in corn oil, 0.05 to 1.25 cc.	Seminal vesicles	0	---	At least 3 mos.
	5 rats	---	M, castr.	0.1% in corn oil	S.C.	3[4]	---	361 days
McEuen et al., 1936a	6 rats	Stock	F, castr.	30 micrograms in corn oil daily	S.C.	2[5]	---	344 days
	5 rats	Stock	M, normal & castr.	--do--	---	4[6]	---	10 mos.
Suntzeff et al., 1936	5 mice	C3H	F	100 r.u. in oil weekly	---	1	---	6.5 mos.
	1 mouse	C3H	M	--do--	---	3	---	16 mos.
	4 mice	D	---	0.33 to 1 r.u. in water daily	---	2	---	7 mos.
	3 mice	D	M	100 r.u. in oil weekly	---	1	---	11 mos.
	5 mice	D	F	--do--				

1. Squamous metaplasia of the cervical glands observed.
2. Six animals hypophysectomized.
3. Plus corpus luteum extract.
4. Pituitary adenoma, breast adenofibroma and adenoma of the adrenal gland.
5. Pituitary adenoma.
6. All tumors were mammary tumors.

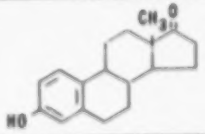
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
				1114.--ESTRONE (Continued) 				
Suntzeff et al., 1936 (Continued)	6 mice	A	---	0.55 to 5 r.u. in water daily	---	1	---	19 mos.
	5 mice	A	---	0.55 to 10 r.u. in water every 5 days	---	1	---	23 mos.
	8 mice	A	---	20 r.u. in water daily	---	5	---	20 mos.
	12 mice	A	---	100 r.u. in oil weekly	---	4	---	10 mos.
	6 mice	A	F, castr.	1 to 10 r.u. in water daily	---	1	---	20 mos.
	4 mice	A	M	100 r.u. in oil weekly	---	4	---	10 mos.
	4 mice	New Buffalo	---	1 to 10 r.u. in water daily	---	0	All alive at 8 mos.	11 mos.
	7 mice	--do--	---	2 to 10 r.u. in water weekly	---	2	---	25 mos.
	7 mice	--do--	---	50 r.u. in water twice weekly	---	1	---	20 mos.
	4 mice	--do--	---	100 r.u. in oil weekly	---	1	---	19 mos.
	10 mice	Old Buffalo	---	0.55 to 0.5 r.u. in water daily	---	0	All alive at 12 mos.	14 mos.
	6 mice	C57	---	0.5 to 1 r.u. in water daily	---	0	All alive at 21 mos.	25 mos.
	4 mice	C57	---	0.55 to 10 r.u. in water daily	---	0	All alive at 7 mos.	10 mos.
	2 mice	C57	---	0.55 to 10 r.u. in water every 5 days	---	0	All alive at 10 mos.	18 mos.
	5 mice	C57	M	50 r.u. in water twice weekly	---	1	---	16 mos.
Heller et al., 1936	6 rats	---	M, normal & castr.	40 r.u. in oil daily	S.C.	0	---	59 to 67 days
	17 mice	---	--do--	--do--	---	0	---	15 to 29 days
Zondek, 1936a	Rabbits	---	F	2,000 to 25,000 m.u. weekly	S.C.	0	---	At least 5.5 mos.
	Rats	---	F	Large doses	---	0	---	"Months"
Zondek, 1936b	10 rats	---	M	5,000 to 10,000 m.u. twice weekly	---	0	---	1½ weeks
	Rats	---	F	5,000 m.u. twice weekly	---	1[1]	---	Avg. of 16 weeks
	5 rabbits	---	F	100,000 to 1,100,000 m.u. total dose	---	0	---	4-12 weeks
Astwood et al., 1937	Mice	Stock	F, castr.	25-50 micrograms daily	Inj.	0	---	2-6 mos.
Bach, 1937	6 rats	---	---	0.005 mg. or 0.05 mg. daily[2]	---	1	---	44 days
Bachmann et al., 1937	20 mice	Stock	F	0.01%[3] in benzene twice weekly	Skin	0	18 alive at 6 mos., 11 alive at 1 year	430 days
	11 mice	--do--	M	--do--	--do--	0	10 alive at 6 mos., 6 alive at 1 year	705 days

1. Pituitary tumor.
2. Calcium metabolism studied.
3. M.P. 280° corr.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
				1114.--ESTRONE (Continued) 				
Bonser et al., 1937a	Mice	Cancer-resistant	F	---	---	2[1]	---	Over 30 weeks
	--do--	Cancer-susceptible	M	---	---	Tumors[2]	---	--do--
	--do--	Cancer-resistant	M	---	---	0	---	125 weeks
	--do--	--do--	F	---	---	Tumors[3]	---	---
Bonser et al., 1937b	10 mice	CBA	F	0.01% in benzene twice weekly	Skin	2[3]	---	82.5 weeks
Burrows, 1937b	Mice	---	---	0.01 or 0.1% in benzene twice weekly	Skin	0	---	At least 247 days
Champy, 1937a	Guinea pigs	---	F	---	---	0[4]	---	---
Champy, 1937	Guinea pigs	---	F)					
	Rabbits	---	F)	Heavy doses for prolonged period	---	Tumors[5]	---	---
	Rats	---	F)					
Cramer and Horning, 1937	Mice	Stock	---	Prolonged application	Skin	0	---	---
	--do--	R111[6]	---	--do--	--do--	0	---	---
Dessau, 1937	Guinea pigs	---	F, normal and castr.	7 micrograms in oil daily	S.C.	0	---	90 days
Freudenberger and Clausen, 1937	25 rats	Wistar	---	200 i.u. in oil every 2 days	S.C.	0	---	96 to 100 days
Gardner, 1937b	6 mice	A	F	150 i.u. weekly	---	0	---	Over 125 days
	2 mice	C3H	M	--do--	---	1[3]	---	320 days
Gomez et al., 1937	2 mice[7]	---	M	50 i.u. in oil daily	Inj.	0	---	20 days
	5 mice[7]	---	M	50 i.u. in water daily	--do--	0	---	25 days
Kaufmann and Steinkamm, 1937	Rats	---	F, normal and castr.	5 micrograms to 4 mg. in oil daily	S.C.	0[8]	---	400 days
Lacassagne, 1937a	Mice	50	---	Weekly[9]	S.C.	1[10]	---	581 days
Lacassagne, 1937b	--do--	Inbred	---	---	Inj.	Tumors[11]	---	At least 650 days

1. Mammary.
2. Mammary in 10% of animals alive at 30 weeks.
3. Mammary adenocarcinoma.
4. Adenomatous neoplasms of the ovary.
5. Of the ovary.
6. Obtained from Dobrovolskaia-Zavadskaia.
7. Hypophysectomized.
8. Fibrosis of the uterus in one case.
9. Along with equilin and equilenin.
10. In a female.
11. Sarcoma of the thymus and a mesenteric ganglion.

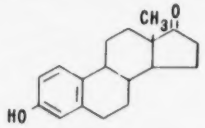
1114.--ESTRONE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Lacassagne, 1937c	10 mice	R3	M & F	50-100 micrograms weekly plus 100-200 micrograms of progesterone	---	9[1]	---	At least 194 days
	9 mice	17 nc, 50 & 39	---do---	---do---	---	2[2]	---	At least 333 days
	5 mice	R3	---do---	100 micrograms weekly plus 500 to 1,000 micrograms of testosterone acetate	---	2[3]	---	Over 120 days
Lacassagne and Ryka, 1937c	Mice	R3	---	100 micrograms weekly	---	Tumors[3]	All dead in 8 mos.	8 mos.
	---do---	17 nc.	M & F	---do---	---	Tumors[4]	---	Over 1 year
	---do---	50	---	---do---	---	0	---	Over 6 mos.
	---do---	39	---	---do---	---	0	---	18 mos.
Loeb et al., 1937	Mice	---	---	---	Inj.	5[5]	---	---
Macola, 1937	17 rats	---	---	12 to 40 i.u. in oil daily	S.C.	0	---	5 mos.
Miglavacca, 1937a	Monkeys	Macacus Rhesus & Papio Hamadryas	F, castr.	60 i.u. daily	Inj.	0	---	21-61 days
Miglavacca, 1937b	8 monkeys	---do---	---do---	---do---	---do---	0	---	---do---
	Rats	---	---do---	6 r.u. daily	---do---	0	---	21 days
Murray and Steinkamm, 1937	37 rats	---	---do---	2085-29,920 micrograms total dose	---	0	---	465 days
Nelson, 1937	Guinea pigs	---	F	1000 i.u. in oil every 2 days	S.C.	0[6]	---	10 mos.
Pierson, 1937a	Over 37 rabbits	---	F, normal and castr.	0.1 mg. twice weekly mostly for 2 mos.[7]	I.M.	2[8]	---	At least 17 mos.
Pierson, 1937b	2 rabbits	---	F, castr.	0.1 mg. twice weekly	I.M.	0	---	2 mos.
Zondek, 1937b	12 human beings	---	F	10,000 to 200,000 m.u. 2 or 3 times weekly	S.C.	0	---	2.5 to 6.7 weeks
	Rabbits	---	F	At least 1,000 m.u. twice weekly	S.C.	0	---	Several mos.
Zuckerman, 1937a	1 monkey	Rhesus	F	100 micrograms in oil daily	I.M.	0	---	365 days
Zuckerman, 1937b	1 monkey	---do---	F	100 micrograms in oil daily for 365 days	Inj.	0	---	399 days

1. Mammary.
2. Sarcoma of the thymus.
3. Mammary adenocarcinoma.
4. Adenomatous nodules of the hypophysis.
5. At or near site of injection.
6. Fibromyomatous growths on uterus in 3 animals.
7. Some animals also tarred on skin of ear.
8. Of the uterus, one in an untarred animal. Also proliferation of mucous membrane and infiltrating growth of mucous gland into musculature.

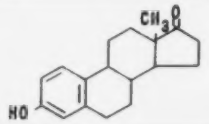
1114.--ESTRONE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Del Castillo and Pinto, 1938	14 rats	---	M	15 i.u. daily	Inj.	0	---	1 mo.
	16 rats	---	M	--do--	--do--	0	---	3 mos.
	Rats	---	M	--do--	--do--	0	---	4 mos.
Crispolti, 1938	Mice	---	M & F	10 m.u. thrice weekly	S.C.	0	---	13 mos.
Danner, 1938	35 mice	---	M & F[1]	10 or 20 i.u. in milk daily	P.O.	0	---	4-16 mos.
Dessau, 1938	30 guinea pigs	---	F, normal and castr.	500-61,200 micrograms (total dose)	S.C. or intra-vaginal	0	---	5 to 224 days
Engle and Smith, 1938	2 monkeys	---	F, castr.	3485 and 135,000 r.u. resp. in oil (total dose)	Inj.	0	---	55 and 135 days
Gardner and Van Wagenen, 1938	2 monkeys	Rhesus	M	100 and 200 r.u. daily	S.C. or I.M.	0	---	34 to 42 days
Lacassagne, 1938a	19 mice	R3	M & F	0.1%[2] in oil, 0.05 cc. weekly	S.C.	18[3]	---	---
	14 mice	R4 and 17	--do--	--do--	S.C.	9[3]	---	---
	5 mice	30	--do--	--do--	S.C.	0	---	---
	4 mice	39	--do--	--do--	S.C.	0	---	---
McEuen, 1938	12 rats	---	F	0.012% in corn oil daily	Vagina	3[4]	6 alive at 550 days	Ca. 975 days
	10 rats	---	F	30 micrograms in corn oil daily	S.C.	3[5]	8 alive at 300 days	Ca. 675 days
	12 rats	---	F	--do--	S.C.	1[6]	9 alive at 350 days	Ca. 775 days
Murphy et al., 1938	12 rats[7]	1-a	M	50 i.u. in water biweekly	S.C.	0	---	165 days
	--do--	--do--	M	--do--	S.C.	0	---	368 days
Pierson, 1938a	2 rabbits	---	F, castr.	0.1 mg. twice weekly	I.M.	0	---	5 weeks
Pierson, 1938b	Rabbits	---	F, castr.	--do--	S.C.	1[8]	---	3 years
Pybus and Miller, 1938	7 mice[9]	---	M	5 mg. as tablet	S.C.	3[10]	---	2.5 mos.

1. Some females castrated.
2. Crude product containing also equilin and equilenin used.
3. Mammary adenocarcinoma.
4. In one site (animal had been tarred), one tumor of the colon and one lymphosarcoma. Also one animal had papilloma of the cervix.
5. 2 lymphosarcomas and one breast cancer; also one precancer of the cervix.
6. Lymphosarcoma.
7. Previously implanted with adenofibromas.
8. Stomach tumor.
9. Died or killed at 2.5 mos.
10. Of the bone.

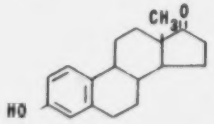
1114.--ESTRONE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Schiff and Felson, 1938	20 human beings	---	M; F, normal and castr.	500-10,000 i.u. daily (approximately) for 15 to 167 days	---	0	---	13 mos.
Störtebecker, 1938	26 guinea pigs	---	F, castr. and normal	1,000 i.u. in arachis oil daily	S.C.	0[1]	---	---
Szarda and Rechnitz, 1938	17 rats	---	F	31,250 to 37,500 i.u., total dose	Inj.	0	---	21 to 30 days
	--do--	---	F	40,000 to 62,500 i.u., total dose	Inj.	0	---	31 to 52 days
	24 rats	---	F	--do--	Inj.	0	---	52 days
Zuckerman, 1938a	2 monkeys	Macaca mulatta	M, castr.	2.5 to 100 micrograms in oil daily	I.M.	0	---	1 year
Ackart and Leavy, 1939	22 salamanders[2]	Amblygon tigrinum	---	25 micrograms in sesame oil twice weekly for 6 weeks	Body cavity	0	7 died from unknown causes	---
Deanesly, 1939a	11 mice	---	M	9 mg. as tablet	S.C.	0	---	50 days
	17 rats	---	M	6.85 to 16.90 mg. as tablet	S.C.	0	---	75 to 263 days
Deanesly, 1939b	1 rabbit	---	M	176 mg. in 2 pellets	S.C.	0	---	40 days
	--do--	---	---	66 mg. in 5 pellets	--do--	0	---	28 days
	--do--	---	M, castr.	20 micrograms in oil daily	--do--	0	---	30 days
Emge, 1939	Rats	---	F	50 i.u. in aq. soln. bi-weekly	---	0	---	20-34 weeks
	Rats[3]	---	F	100-1,000 i.u. in oil daily	---	0	---	---
Emmens, 1939b	3 fowls	Brown leghorn	M	5 to 89 mg. as tablet	I.M.	0	All dead in 75 days	34 to 75 days
Folley et al., 1939	13 monkeys[4]		M	0.7 to 290 mg. (total dose)	Inj.	0	---	6 to 484 days
	6 monkeys	Rhesus	F, normal and castr.	0.3 to 36.5 mg. (total dose)	Inj.	0	---	37 to 938 days
Gaarenstroom and Levie, 1939	8 rats	---	---	5 micrograms in olive oil daily	S.C.	0	---	28 days

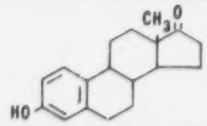
1. In castrated animals, tumorous fat accumulation in the parametrium and fatty infiltration in the liver.
2. Larvae used.
3. Previously implanted with adenofibromas.
4. 12 rhesus (*Macaca mulatta*) and one Hanuman langur (*Presbytis entellus*).

1114.--ESTRONE (Continued)



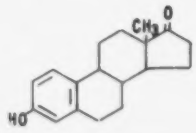
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Geschickter, 1939a	4 rats	Inbred	M & F, castr.	50 micrograms in oil daily	I.M.	3[1]	---	565 days
	8 rats	--do--	--do--	100 micrograms in oil daily	--do--	--do--	---	400 days
	13 rats	--do--	M & F, castr.	200 micrograms in oil daily	I.M.	5[2]	---	200 days
	28 rats	--do--	M & F	25 micrograms in oil twice daily plus crystalline pellets	I.M.	6[2]	17 alive at 247 days	247 days
	11 rats	--do--	M & F	Crystalline pellets	--do--	2[2]	All alive at 43 days	43 days
	18 rats	--do--	M & F, castr.	25 micrograms in oil twice daily plus crystalline pellets	--do--	4[2]	7 alive at 240 days	240 days
Geschickter, 1939b	11 rats	---	M & F	2.6-3.0 mg. pellets, 3 in each animal	S.C.	8[3]	---	At least 315 days
	25 rats	---	M & F, castr.	50-200 micrograms in oil daily	S.C.	12[4]	---	At least 565 days
	Rats	---	---	100 micrograms in oil daily	Inj.	Tumors[5]	---	Over 375 days
	38 rats	---	M & F, normal and castr.	25 micrograms in oil twice daily plus pellets	S.C.	23[6]	---	260 days
Grumbrecht and Loeser, 1939	15 rats	---	F	1 mg. in sesame oil daily	P.O.	0	---	45 days
Hume et al., 1939	Rats	---	M	18 micrograms daily plus 18 micrograms thrice weekly	P.O. & S.C.	0[7]	---	Avg. of 156 days
	--do--	---	M, castr.	--do--	--do--	--do--	---	Avg. of 148 days
Lipschütz et al., 1939d	13 guinea pigs	---	F	5 to 400 micrograms repeated injections	S.C.	Tumors[8]	---	93-102 days
Lipschütz and Vargas, Jr., 1939a	4 guinea pigs	---	F, castr.	400 micrograms in vegetable oils thrice weekly	S.C.	3[9]	---	123 days
McEuen, 1939	28 rats	---	M, normal and castr.	250-1500 i.u. daily[10]	P.O.	2[11]	---	At least 930 days
	30 rats	---	F, normal and castr.	1000-1500 i.u. daily	P.O.	8[12]	---	---

1. Mammary, in male.
2. Mammary, in females.
3. Mammary carcinoma within 10 mos.
4. Mammary carcinoma in 150-565 days.
5. Mammary carcinoma in average time of 375 days.
6. Mammary carcinoma.
7. Papillomatosis observed in the bladder.
8. In at least 3 animals, 6 genital and 2 extra-genital.
9. Of the uterus.
10. Crude product used.
11. Stomach carcinoma and pituitary adenoma.
12. Not all necessarily malignant. One carcinoma, 4 lymphosarcomas and one papillomatosis.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1114.--ESTRONE (Continued) 								
McEuen et al., 1939	Rats	---	---	100 to 150 i.u. daily	P.O.	1[1]	---	880 days
Nelson, 1939	Guinea pigs	---	F	50 to 100 r.u. in oil daily	---	0	---	3 to 14 mos.
Parkon and Pitts, 1939	Rats	---	F, castr.	80 and 400 u. total dose	Inj.	2[2]	---	3.5 and 5 weeks
Perry and Lockhead, 1939	131 mice	---	F	1 to 3 times weekly	Skin	3[3]	41 alive at 7 mos.	At least 7 mos.
Silvestroni, 1939	25 rats	Albino	F, castr.	6 r.u. daily for 21 days	Inj.	0[4]	---	70 days
	5 rats	--do--	F	6 r.u. daily for 30 days	Inj.	0[6]	---	--do--
Turner, 1939	22 mice	C3H	M & F	340 i.u. (total dose) in oil during 34 weeks	S.C.	Tumors[5]	---	60 weeks
Twombly, 1939	21 mice	RIII	M	0.06 to 0.2 mg. crystals	S.C.	2[7]	16 dead in 100 days	6.5 mos.
Grumbrecht and Loeser, 1940	13 rats	---	F	1 mg. in sesame oil daily	S.C.	0	2 died in 121 days	191 days
Van Gulik and Korteweg, 1940	68 mice	C57	F, castr.	10-81 i.u. weekly in food	P.O.	0	---	17 weeks
	19 mice	dba	--do--	--do--	--do--	0	---	--do--
	11 mice	C57	--do--	3-5 i.u. in water weekly	S.C.	0	---	11 weeks
	15 mice	dba	--do--	--do--	--do--	0	---	--do--
	17 mice	C57	--do--	3-6 i.u. in olive oil weekly	Inj.	0	---	4 weeks
	15 mice	dba	--do--	--do--	--do--	0	---	--do--
	21 mice	BdF_1	--do--	--do--	--do--	0	---	--do--
	20 mice	dBF_1	--do--	--do--	--do--	0	---	--do--
	5 mice	C57	--do--	1-6 i.u. in olive oil weekly	S.C.	0	---	7 weeks
	14 mice	dba	--do--	--do--	--do--	0	---	--do--
	15 mice	BdF_1	--do--	--do--	--do--	0	---	--do--
	14 mice	dBF_1	--do--	--do--	--do--	0	---	--do--
	22 mice	Pure & F_1 hybrids	--do--	1-9 i.u. weekly	Inj.	0	---	12 weeks
Lyons and Sako, 1940	6 rabbits	---	M	300 i.u. or 30 i.u. in sesame oil (total dose)	Skin of mammary gland	0	---	5 weeks
Noble et al., 1940	Rats	---	F	4-11 mg. as pellets[8]	S.C.	28[9]	47 alive at 8 mos.[10]	Over 343 days

1. Pituitary adenoma.
2. One of hypophysis the other abdominal with multiple metastases.
3. Pituitary tumor. 2 of the mice with tumors had inguinal implants of dibenzanthracene.
4. Adenomatous nodules in uterus.
5. All females died of mammary cancer. In the males there occurred one mammary carcinoma and other types of tumors.
6. Some metaplasia. Changes from cylindrical to pavement epithelium.
7. Mammary carcinoma. 14 additional tumors were obtained in other similarly treated male mice.
8. Receiving also subcutaneous injections of thyreotrophic extract.
9. Mammary gland; first at 226 days.
10. For other data on same animals see Noble and Collip, 1941.

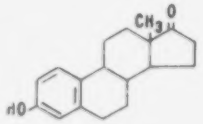
1114.--ESTRONE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Nonaka, 1940	Mice	Stock	---	10,000 units weekly	Uterine wall	0[1]	---	---
	--do--	--do--	---	--do--	S.C.	0[1]	---	---
Ratschow and Steckner, 1940	20 rats	White	M & F	2.5 mg. in 1.5 cc. of oil	S.C.	---	---	---
Rodriguez, 1940	56 guinea pigs	---	F, castr.	38-17,600 micrograms (total dose) thrice weekly during 95-123 days	S.C.	10[2]	---	123 days
Rodriguez[3]	Guinea pigs	---	--do--	5-80 micrograms thrice weekly	Inj.	0	---	3 mos.
Shimkin and Grady, 1940a	10 mice	C3H	F	1.2 mg. (total dose) in peanut oil	S.C.	10[4]	---	36 weeks
	--do--	--do--	M	--do--	S.C.	2[4]	---	54 weeks
Speert, 1940	3 monkeys	Rhesus	M	0.05 mg. per cc., 95% alcohol, daily for 50-75 days	Skin of nipple	0	---	75-105 days
Twombly, 1940	Mice	C57 bl.[5]	M	Crystals weighing ca. 0.1 mg.	S.C.	9[4]	27 alive at 9 mos.	At least 11 mos.
Allen and Gardner, 1941	Mice	---	F	---	Inj.	Cancers[6]	---	---
Andervont and Shimkin[7]	30 mice	C3H	M	1.5-2.0 mg. crystals	S.C.	0	1 alive at 6 mos.	8 mos.
Bischoff et al., 1941	30 mice	Marsh-Buffalo	F	0.066 mg. in sesame oil weekly	Inj.	1[8]	13 dead at 8 mos., 27 dead at 11 mos.	11 mos.
	--do--	--do--	F	0.066 mg. in sesame oil weekly on alternate months	--do--	Tumors[9]	---	10 mos.
	40 mice	--do--	F	0.08 mg. in sesame [illegible] twice weekly for 6 mos.	I.M.	--do--	10 dead at 5 mos.	17 mos.
	30 mice	--do--	M	100 Doisy units in water or oil weekly for 13 mos.	Inj.	16[10]	---	20 mos.
Bittner, 1941	148 mice[11]	Pure and hybrids	M & F	Pellets (avg. wt. 2 mg.)	S.C.	21[4]	---	16 mos.
Bourne and Zuckerman, 1941	120 rats	Wistar	F, castr.	3.75-10.0 i.u. in nut oil daily	S.C.	0	---	"prolonged period"

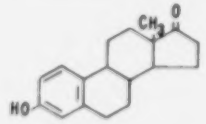
1. Myeloid changes observed.
2. Fibromas or fibromyomas on uterus.
3. Unpublished results cited by Lipschütz and Vargas, Jr., 1940.
4. Breast tumors.
5. Nursed by Bill mothers.
6. Cervical.
7. Unpublished results cited by Shimkin and Grady, 1941a.
8. Breast adenocarcinoma at 8 mos.; much less than in controls.
9. Breast adenocarcinoma and lymphosarcoma. Incidence not far different from controls.
10. 9 lymphosarcomas, 5 fibrosarcomas, 2 fibromas, no breast tumors.
11. Foster nursed by high and low cancer strains.

1114.--ESTRONE (Continued)

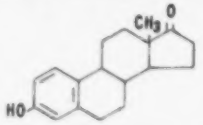


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Deanesly and Parkes, 1941	5 rats[1]	---	M	Pellet of avg. wt. 14.7 mg.	S.C.	0	---	1 year
	--do--	---	M	Pellet of avg. wt. 50.9 mg.	--do--	0	---	--do--
	10 rats	---	M	Pellet of Ca. 15 mg.	S.C.	0	---	30 days
	5 rats	---	M, castr.	Pellets of 15 mg.	--do--	0	3 alive at 1 year	1 year
Figelist, 1941	28 guinea pigs	---	F, castr.	In cylinder 0.1-2.1 mg. absorbed	S.C.	Tumors[2]	---	120 days
Franseen et al., 1941b	5 mice	A	---	Pellet (100%)	Adrenal	0	---	---
	10 mice	A	---	50% cholesterol pellet	--do--	0	---	---
	5 mice	A	---	--do--	Lymph nodes	0	---	---
	11 mice	A	---	Pellet (100%)	--do--	0	---	---
Gardner et al., 1941	Mice	CBA, C3H, C57, JK, A & hybrids	---	Pellets	S.C.	0	---	At least 450 days
Von Haam et al., 1941	Rats	---	M & F, normal and castr.	1 mg. thrice weekly	Inj.	0	---	1 mo.
	--do--	---	M & F, castr.	0.1 mg. thrice weekly	Inj.	0	---	1 mo.
Jadassohn et al., 1941	Guinea pigs	---	M	1 microgram per cc., 1 drop daily for 10 mos.	Nipple	0	---	14 mos.
Lipschütz, 1941	Guinea pigs	---	F, castr.	Tablets	S.C.	Tumors[3]	---	120 days
Lisco and Biskind, 1941	25 mice	C3H & stock	M & F	2 pellets avg. wt. 1.4-5.6 mg.	S.C.	0	---	Over 54 mos.
Mark and Biskind, 1941	24 rats	---	F, normal and castr.	Pellets, 0.9-3.7 mg.	S.C.	0	---	237 days
Morrell and Hart, 1941a	Rats	---	F	1.25-250 micrograms in corn oil daily for up to 52 days	Inj.	0	---	Up to 72 days
	Rats	---	F	500 micrograms in corn oil daily for up to 90 days	--do--	0	---	113 days
Morrell and Hart, 1941c	Rats	---	M, normal and castr.	5-500 micrograms in corn oil daily for 52-56 days	--do--	0	---	73 days

1. Hypophysectomized.
2. Abdominal; first at 21 days.
3. Uterine and extra-genital fibromas.

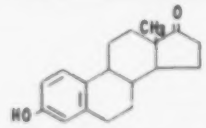
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1114.--ESTRONE (Continued) 								
Perloff and Kurzrok, 1941	2 guinea pigs	---	F	Ca. 3 mg. as pellets	Uterus	0	---	150 days
Shimkin and White, 1941	8 mice	A & C3H	M	Cholesterol pellets, 25-100%, 3.5-4.0 mg.	S.C.	0	---	70 days
Zuckerman, 1941	19 monkeys	M. mulatta	F, castr.	7.5-10 micrograms in arachis oil daily	I.M.	0	---	522 days
Bischoff et al., 1942a	40 mice	Marsh-Buffalo	F	0.25 in sesame oil, 0.04 cc. twice weekly for 6 mos.	S.C. or I.M.	Tumors[1]	---	At least 12 mos.
Forbes, 1942	15 rats	---	M & F	Pellets	S.C.	0	---	At least 400 days
Geschickter and Byrnes, 1942	6 monkeys	---	---	Pellets or injected	---	0	---	Over 3 years
	4 rats	---	F & M, castr.	50 micrograms daily	Inj.	3[2]	---	598 days
	4 rats	---	M & F, all castr.	100 micrograms daily	Inj.	4[2]	---	408 days
	17 rats	---	M & F, normal and castr.	200 micrograms daily	Inj.	9[2]	---	334 days
	12 rats	---	M & F	Pellets of 2.5 mg. each	S.C.	6[3]	---	350 days
	4 rats	---	F, normal and castr.	Multiple pellets	S.C.	6[4]	---	90 days
	5 rats	---	M & F, all castr.	200 micrograms daily for 90 days, and after 14 years 2 pellets in breast in 3 animals.	Inj.	3[5]	---	2 years
	4 rats	---	M & F, castr.	2.5-5 micrograms daily for 594 days, and massive dose (injections or pellets) for 98 days	Inj.	2[5]	---	692 days
	78 rats	---	M & F	Multiple pellets	S.C.	48[2]	---	Up to 512 days
	8 rats	---	M & F	Multiple pellets	S.C.	Tumors[6]	---	420 days
Griffiths and Young, 1942	12 rats	---	M	Pellets 15 mg. avg. absorption 0.26 mg. daily	S.C.	0	---	4 weeks
Lipschütz et al., 1942a	18 guinea pigs	---	F, castr.	Pellets	S.C.	Tumors[7]	---	120 days

1. Lymphosarcomas and adenocarcinomas of the breast.
2. Mammary cancer.
3. Mammary cancer, also benign fibroadenomas.
4. Mammary cancer; first at 21 days.
5. Mammary cancers in only those receiving also pellets.
6. One myeloid leukemia, 7 breast cancers, 7 lymphosarcomas (thymus and mesentery, breast, spleen, and lymph nodes).
7. Uterine and non-genital.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1114.--ESTRONE (Continued) 								
Marx et al., 1942	Rats	---	---	Large doses	Inj.	0	---	Several mos.
Miller and Pybus, 1942	135 mice	Simpson	M & F, normal and castr.	0.06% in olive oil, 0.05 cc. weekly	S.C.	44[1]	---	Ca. 21 mos.
	75 mice	Edinburgh	--do--	--do--	--do--	3[1,2]	---	Ca. 27 mos.
	112 mice	CBA	--do--	--do--	--do--	0[3]	---	Ca. 30 mos.
Twombly[4]	76 mice	C57 bl.[5]	U	Crystals	S.C.	22[6]	---	---
	35 mice	C57 bl.	U	--do--	S.C.	0	---	---
	48 mice	R111[5]	U	--do--	S.C.	13[8]	---	---
	59 mice	R111	U	--do--	--do--	29[8]	---	---
Carrasco, 1945	9 guinea pigs	---	F	0.3-1.9 mg. pellets absorbed	S.C.	Tumors[9]	---	62 days
	17 guinea pigs	---	F	0.5-1.5 mg. pellets absorbed	Liver	--do--	---	--do--
	6 guinea pigs	---	F	0.2-1.8 mg. absorbed from pellets	S.C.	--do--	---	82 days
	14 guinea pigs	---	F	0.9-2.6 mg. absorbed from pellets	Liver	--do--	---	81 days
Emery, 1945	10 rats	Albino	F, castr.	0.1 mg. in sesame oil daily	I.P.	0	---	50 days
	12 rats	--do--	M, castr.	0.5 mg. in sesame oil every 5 days	I.P.	0	---	50 days
Lipschütz and Carrasco, 1945	6 guinea pigs	---	F, castr.	1.2 mg. tablet	S.C.	Tumors	---	80 days
	12 guinea pigs	---	--do--	1.4 mg. tablet	Liver	--do--	---	--do--
	2 guinea pigs	---	--do--	2.1 mg. tablet	--do--	--do--	---	--do--
Miller et al., 1945	45 mice	NBT	M	5 mg. tablet	S.C.	3 sarc.[10]	---	6.5 mos.
	26 mice	--do--	M	0.02% in benzene twice weekly	Skin	---	---	---
	16 mice	Simpson	M & F	--do--	--do--	0	---	9.5 mos.
	18 mice	Edinburgh	--do--	--do--	--do--	0	---	13.5 mos.
	11 mice	CBA	--do--	--do--	--do--	0	---	17.5 mos.
	32 mice	NBT, Simpson, Edinburgh & CBA	--do--	2-3 mg. tablet	S.C.	0	---	3.5 mos.
	17 mice	NBT	M	5 mg. tablet removed at 6 weeks	S.C.	0	---	16.5 mos.
Picco, 1945	Rat	Albino	F	500-199,000 I.u. (total dose)	Inj.	0[11]	---	318 days

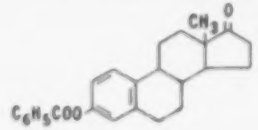
1. Mammary. Increase in lymphadenopathy in all strains.
2. None in normal males or females.
3. No mammary tumors but 30 uterine fibromas and fibrosarcomas.
4. Unpublished results cited by Shimkin and Andervont, 1942.
5. Nursed by R111 mothers.
6. Mammary adenocarcinoma.
7. Nursed by C57 black mothers.
8. Mammary.
9. Abdominal.
10. Of the bone; 2 doubtful and one occured within the spontaneous tumor age.
11. Tumors near site.

1114.--ESTRONE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Schenken and Burns, 1943	39 mice	C3H	M & F	100 r.u. in sesame oil weekly	S.C.	9[1]	---	---
Bogart et al., 1944	16 rats	---	F	100 i.u. per cc. in peanut oil daily	S.C.	0	---	At least 3 mos.
Chevrel-Bodin and Cormier, 1944	7 rabbits	---	---	18 mg. - 300 mg. in oil	S.C.	Tumors	---	---
Gardner and Dougherty, 1944	105 mice	C3H, A, CBA, C57, JR, PM	M & F	Pellets	S.C.	Tumors[2]	---	---
Gardner et al., 1944	50 mice 81 mice	C3H ---do---	--- ---	50 micrograms in sesame oil weekly Pellets	S.C. S.C.	6 15[2]	--- ---	--- ---
Lipschütz and Carrasco, 1944	15 guinea pigs	---	F, castr.	0.4-5.6 mg. tablet	S.C.	6[3]	---	60-85 days
	29 guinea pigs	---	---do---	1.0-5.6 mg. tablet	Liver	13[4]	---	---do---
Loeb et al., 1944	92 mice	C3H	M & F	100 r.u. weekly	S.C.	30[5]	---	At least 5 mos.
Mello, 1944	27 guinea pigs	---	F, castr.	Ca. 5.5 mg. pellets	S.C.	Tumors[6]	---	90 days
Murphy, 1944	37 mice	RIC	---do---	2 or 3 mg. pellet	S.C.	Leukemia[7]	High mortality	Over 250 days
Nelson, 1944	55 rats	Long-Evans	M & F	605-610 mg. pellets every 2-4 mos.	Inj.	20[8]	---	Ca. 900 days
Segaloff and Segaloff, 1944	Rats	Sprague-Dawley	F	140 micrograms	Spleen	0	---	At least 5 weeks
	Rats	---do---	F	4-8 micrograms	S.C.	0	---	---do---
van Wagenen and Morse, 1944	1 monkey	Rhesus	F	10 mg., repeated injections	I.M.	0	---	At least 93 days
Chu and You, 1945	2 rabbits[9]	---	F	1 mg. daily	S.C.	0	---	20-40 days
Mello, 1945	27 guinea pigs	---	F	0.7-1.8 mg. absorbed from pellets	S.C.	Tumors[10]	---	92 days
Williams et al., 1946	3 dogs	Toy fox terrier	F	2-6 micrograms daily in sesame oil	Skin	0	---	44 days
Drill and Pfeiffer, 1946	Rats	Yale	F	5.0 mgm.	S.C.	0	---	At least 30 days

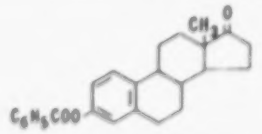
1. Of the liver, all in males.
2. Lymphoid.
3. Abdominal fibroids out of 6 animals.
4. Abdominal fibroids out of 14 animals.
5. Mammary carcinoma.
6. Abdominal fibroids.
7. Figures not significant (author).
8. Carcinoma and adenocarcinoma.
9. Thyroidectomized.
10. Uterine and non-genital.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1115.--ESTRONE BENZOATE 								
Lacassagne, 1932	10 mice	---	M, castr.	0.06% in oil, 0.05 cc. weekly	Inj.	0	---	---
	5 mice	R5	M & F	--do--	Inj.	3[1]	---	---
Lacassagne, 1933a	40 mice	---	M, normal and castr.	0.06% soln., 0.05 cc. weekly	Inj.	0	---	5 mos.
Bonser, 1935	10 mice	A	M	500 I.u. in olive oil weekly	S.C.	3[2]	4 neg. alive at 53 weeks	53 weeks
	54 mice	[illegible]	M	--do--	S.C.	0	---	At least 40 weeks
	Mice	A	M	--do--[3]	S.C.	0	---	30 weeks
	--do--	B	M	--do--	S.C.	0	---	--do--
Gardner et al., 1935	Mice	A	M	500 I.u. in oil weekly	Inj.	0	---	---
	--do--	C3H	M	--do--	Inj.	0	---	---
Lacassagne, 1935a	6 rabbits	---	F	1,000 to 10,000 I.u. in oil weekly for 7 mos.	---	0	---	2 years, 4 mos.
Lacassagne, 1936c	Mice	R5	M & F	500 I.u. in oil weekly	---	0	---	At least 14 mos.
	12 mice	Inbred	M	--do--	Inj.	11[2]	---	16 mos.
	Mice	XVII and R4	M & F	--do--	Inj.	Tumors[3]	10 alive at 8 mos.	16 mos.
Bonser, 1936	79 mice	A	M	500-600 I.u. in olive oil weekly or 0.01%[4] in benzene twice weekly	S.C., Skin	3[2]	---	8-32 weeks
Burrows, 1936c	8 mice	---	M	0.01% in benzene twice weekly	Skin	0	---	174 days
Gardner et al., 1936a	Mice	Inbred	F	Usually 500 I.u. in oil weekly	---	0	---	Several weeks
Gardner et al., 1936b	6 mice	A	M	500 I.u. in oil weekly	S.C.	2[5]	2 neg. killed in 19 weeks	199 days
	2 mice	C3H	M	--do--	S.C.	0	---	17 weeks
Gardner et al., 1936d	Mice	A	M & F	---	Inj.	1 sarc.[5]	---	At least 125 days
	11 mice	C3H	--do--	500 I.u. weekly	Inj.	1 sarc.[6]	---	---
	8 mice	CBA	F	500 I.u. weekly[7]	---	2[5]	4 neg. alive at 1 year	At least 1 year
	5 mice	--do--	M	--do--	---	0		

1. Adenocarcinoma in males; first tumor at 5 mos.
2. Mammary adenocarcinoma.
3. With a vitamin A deficient diet.
4. Of free estrone.
5. In a male; also several mammary tumors.
6. Also 7 mammary tumors in males.
7. Plus estradiol benzoate.

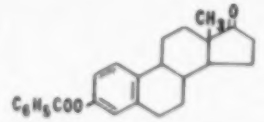
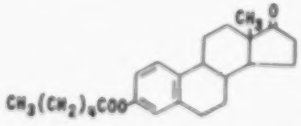
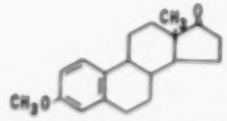
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

1115.--ESTRONE BENZOATE (Continued)

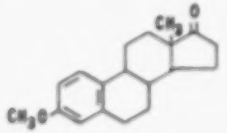
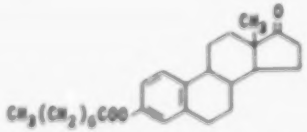


Lacassagne, 1936a	Mice	---	---	Weekly	Inj.	Tumors[1]	---	18 mos.
	--do--	---	---	--do--	Inj.	Tumors[2]	---	10 mos.
	--do--	---	---	--do--	Inj.	0	5 alive at 12 to 15 mos.	15 mos.
Tuchmann, 1936	Guinea pigs	---	M	In oil	Testis	0	---	---
Bang, 1937	--do--	---	F	---	S.C.	0	---	---
Bonser et al., 1937b	22 mice	CBA		500 I.u. in olive oil weekly	S.C.	5[3]	---	At least 105 weeks
	10 mice	--do--	F	0.01% in benzene[5]	S.C	2[3]	---	At least 82.5 weeks
Gomez et al., 1937	--do--[4]	---	M	50-500 I.u. weekly	Inj.	0	---	114 days
Lacassagne and Raynaud, 1937a,b	Mice[6]	---	---	0.1% in oil, 0.05 cc. weekly	Inj.	0	---	---
Nelson, 1937	Guinea pigs	---	---	2450 I.u. in oil twice weekly	S.C.	0[7]	---	10 mos.
Gardner and van Wagenen, 1938	4 monkeys	Rhesus	M & F	1,000 to 4,000 r.u. twice weekly	S.C. or I.M.	0	---	9 to 22 weeks
Lacassagne, 1938a	8 mice	R3	M & F	0.1% in oil, 0.05 cc. weekly	S.C.	5[8]	---	---
	4 mice	17 nc	--do--	--do--	S.C.	0	---	---
	1 mouse	39	--do--	--do--	S.C.	0	---	---
Deanesley, 1939b	3 rabbits	---	M	2 mg. in oil	S.C.	0	---	33 days
Gardner and Allen, 1939	12 mice	A	F	50 micrograms in sesame oil weekly	S.C.	4[9]	---	Avg. of 174 days
Lacassagne and Chamorro, 1939	Mice[10]	---	M	In oil weekly	Inj.	0	---	152 days
	--do--	---	M	Crystals	S.C.	0	---	--do--
	Mice[6]	R3	---	50 micrograms weekly	Inj.	0	---	Over 2-3 mos.
	--do--	---	---	---	---	Tumors[9]	---	---
Nelson, 1939	Guinea pigs	---	F	120 r.u. in oil daily	---	0	---	3 to 14 mos.
Zondek and Mark, 1939	2 fowls	---	M, castr.	1,600,000 I.u. over 16 weeks	---	0[11]	---	16 weeks
	15 fowls	---	--do--	225,000-1,200,000 I.u.	---	0[11]	---	5-15 weeks
Cook et al., 1940a	Mice	---	---	---	S.C.	0[12]	---	---

1. All died of breast adenocarcinoma between 9 and 18 mos.
2. Breast adenocarcinoma between 4 and 10 mos.
3. In a male; also several mammary tumors.
4. Hypophysectomized.
5. Plus simultaneous injections of prolactin.
6. Hypophysectomized after mammary growth.
7. Fibromatous growth on uterus in 2 animals.
8. Mammary adenocarcinomas chiefly.
9. Mammary carcinoma.
10. Hypophysectomized at beginning.
11. Lipemia and calcemia obtained.
12. No liver lesions in 8 livers examined.

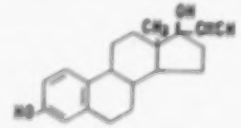
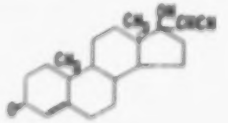
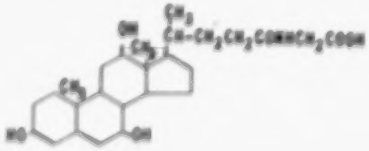
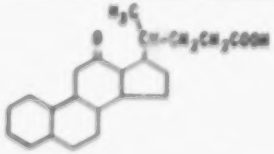
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1115.--ESTRONE BENZOATE (Continued) 								
Haagensen, 1940[1]	107 mice	C57 bl.	M	"Maximal doses" in oil twice weekly	---	0	---	---
Lacassagne and Daruysz, 1941	17 mice	RIII	M & F	50 micrograms weekly	Inj.	8[2]	---	Ca. 548 days
Haagensen and Randall, 1942	111 mice[3]	Paris R3	F	0.05 mg. in sesame oil weekly	S.C.	83 carc.[4]	---	At least 10.2 mos.
	85 mice[3]	Marsh	F	--do--	--do--	18 carc.[4]	---	At least 9.4 mos.
	--do--	C57	F	--do--	--do--	0 carc.[5]	---	At least 14.3 mos.
	112 mice[3]	Paris R3	M	--do--	--do--	98 carc.[5]	---	At least 9.9 mos.
	82 mice[3]	Marsh	M	--do--	--do--	12 carc.[5]	---	At least 11.3 mos.
	104 mice[3]	C57	M	--do--	--do--	0	---	At least 8 mos.
	35 mice	Marsh	M	0.05 mg. in sesame oil weekly, 4-6 weeks	--do--	0	---	---Death
	18 mice	C57	M	--do--	--do--	0	---	--do--
	51 mice	Pure strain	F	--do--	--do--	Carc.[6]	---	--do--
Chamorro, 1943c	10 rats	---[7]	M & F	50-100 micrograms in olive oil, once or twice weekly	S.C.	5[8]	---	Over 609 days
Dubois, 1944	98 mice	RIII & 30 hybrid	---	50 micrograms in oil weekly	---	0	---	At least 90 days
1116.--ESTRONE n-HEXANOATE 								
Mieschor et al., 1938b	Rats	---	F	50 micrograms (total dose) in sesame oil	S.C.	0	---	Ca. 30 days
1117.--ESTRONE METHYL ETHER 								
Barry et al., 1935	20 mice	Stock	F	0.1% in benzene twice weekly	Skin	0	15 alive at 6 mos., 6 alive at 321 days	321 days

1. Unpublished results cited in Twomey, 1940.
2. Adenocarcinoma.
3. Surviving 4 mos.
4. Mammary tumors; instance of tumors not significantly increased over controls.
5. Mammary.
6. Mammary tumors; no increase over controls.
7. Strain free from spontaneous tumors.
8. Mammary adenocarcinomas; first at 609 days.

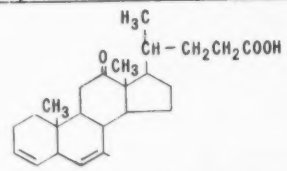
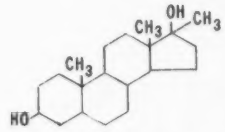
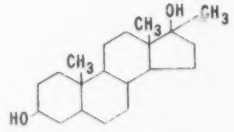
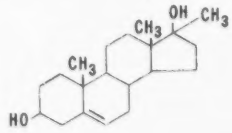
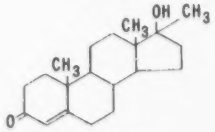
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1117.--ESTRONE METHYL ETHER (Continued) 								
Barry et al., 1955 (Continued)	10 mice	Stock	F, castr.	0.1% in benzene twice weekly	Skin	0	5 alive at 6 mos., 5 alive at 282 days	282 days
	20 mice	---do---	M	---do---	---do---	0	12 alive at 6 mos., 5 alive at 296 days	296 days
	20 mice	---do---	M	---do---	---do---	0	2 alive at 6 mos.	245 days
	4 mice	---do---	M, castr.	---do---	---do---	0	4 alive at 6 mos., 2 alive at 258 days	258 days
Burrows, 1955a	40 mice	---	---	0.01-0.1%[1] in benzene or alcohol twice weekly	---do---	0	---	---
Burrows, 1955c	Mice	---	M	0.1% in benzene twice weekly	---do---	0	---	At least 349 days
Burrows, 1955d	---do---	---	---	In benzene solution	Skin	0	---	---
Burrows, 1956b	---do---	Stock	M	0.1% in benzene twice weekly	---do---	0	---	Avg. of 299 days
Burrows, 1956c	11 mice	---	M	---do---	---do---	0	---	322 days
Bachmann et al., 1957	20 mice	Stock	F	0.1%[2] in benzene twice weekly	---do---	0	19 alive at 6 mos., 4 alive at 1 year	524 days
	10 mice	---do---	F, castr.	0.1% in benzene twice weekly	---do---	0	5 alive at 6 mos., 2 alive at 1 year	507 days
	20 mice	---do---	M	---do---	---do---	0	12 alive at 6 mos.	332 days
1118.--ESTRONE n-OCTANOATE 								
Miescher et al., 1938b	Rats	---	F	50 micrograms (total dose) in sesame oil	S.C.	0	---	Ca. 35 days

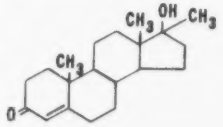
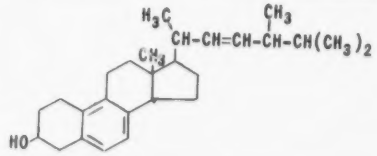
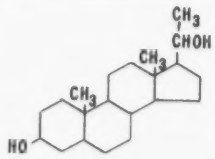
1. C.P. grade of substance used.

2. M.P. 167°.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1119.--17-ETHINYL ESTRADIOL 								
Cook et al., 1940a	Mice ---do---	--- ---	--- ---	--- ---	S.C. P.O.	0[1] ---do---[2]	--- ---	--- ---
1120.--ETHINYL TESTOSTERONE 								
Chamorro, 1965a	25 mice	---	M, castr.	6-10 mg. in olive oil, 6 injections	I.P	0	---	Ca. 19 weeks
Just, 1941	55 tadpoles	---	---	10 mg. in water	---	0	---	2 mos.
Chamorro, 1966	56 mice	Balb	M & F	1, 1.5 & 2 mg. weekly in olive oil	S.C. & I.P.	0	---	Ca. 48 weeks
Kochakian, 1965	2 mice	Murray-Little dba	---	Pellets, 1.8 mg. monthly absorbed	Implanted	0	---	60 days
1121.--GLYCOCHOLIC ACID 								
Isaacs, 1940b	12 rats	---	---	Subc. in water (avg. 10 mg.) 1-6 times weekly	S.C.	0[3]	---	At least 70 days
1122.--12-KETO-18,19-BISNORCHOLANIC ACID 								
Domagk, 1958	Mice	---	---	18 in oil, 41 times	Skin	0	Majority died early	---

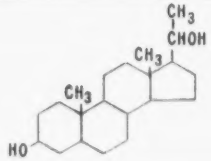
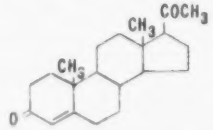
1. No liver lesions in 3 livers examined.
2. No liver lesions in 8 livers examined.
3. Pernicious anemia-like syndrome in 3 animals.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1123.--12-KETOCHOLADIENIC ACID 								
Domagk, 1938	Mice	---	---	1% in oil, 41 times	Skin	0	---	---
1124.--17-METHYL ANDROSTANEDIOL-3α,17α 								
Kochakian, 1945	20 mice	Murray-Little dba	Castr.	0.6-6.90 mgm. monthly absorbed from pellets	Implanted	0	---	60 days
1125.--17-METHYL ANDROSTANEDIOL-3β,17α 								
Kochakian, 1945	7 mice	Murray-Little dba	Castr.	1.80-2.40 mgm. monthly absorbed from pellets	Implanted	0	---	60 days
1126.--17-METHYL Δ 5-ANDROSTENEDIOL-3β,17α 								
Kochakian, 1945	4 mice	Murray-Little dba	Castr.	2.40 mgm. monthly absorbed from pellets	Implanted	0	---	60 days
1127.--17-METHYLTESTOSTERONE 								
Bottomley and Folley, 1938	5 guinea pigs	---	M	2 mg. in sesame oil daily	Inj.	0	---	34 days
Deanesly, 1939b	3 rabbits	---	♂, castr.	101-175 mg. as pellets	S.C.	0	---	15 to 40 days

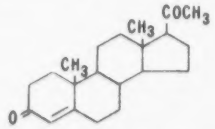
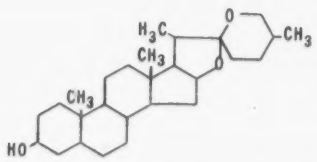
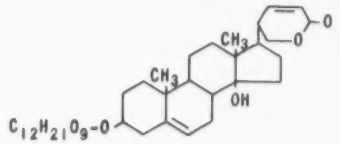
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1127.--17-METHYLTESTOSTERONE (Continued) 								
Forbes, 1941	12 rats	---	M & F	Pellets, 6-10 mg.	S.C.	0	---	At least 36 days
Vest et al., 1941	1 monkey	Macaque	M, castr.	2 pellets successively, weights 333 and 348 mg.	S.C.	0	---	88 days
Forbes, 1942	19 or 20 rats	---	M & F	Pellets	S.C.	0	---	At least 33 days
Lewis and McCullagh, 1942	11 rats	---	M	5 mg. daily	P.O.	0	---	38 days
	5 rats[1]	---	M	--do--	--do--	0	---	30 days
Selye and Row, 1943	12 rats	Albino	M	0.1 cc. peanut oil plus 5 mg., 2 daily injections	S.C.	0	---	At least 76 days
Kochakian, 1945	22 mice	Murray-Little dba	Castr.	0.14-14.40 mgm. monthly absorbed from pellets	Implanted	0	---	60 days
1128.--NEOERGOSTEROL 								
Barry et al., 1935	20 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	10 alive at 6 mos., 6 alive at 1 year	511 days
Bachmann et al., 1937	--do--	--do--	---	--do--	--do--	0	--do--	534 days
1129.--OUABAIN[2]								
Smith and Gardner, 1939	7 mice	---	M	1% in sesame oil, 0.1 cc. twice weekly, 10 injections	S.C.	0	1 alive at 100 days	334 days
1130.--PREGNANEDIOL 								
Barry et al., 1935	20 mice	Stock	---	0.3% in alcohol twice weekly	Skin	0	16 alive at 6 mos., 9 alive at 1 year	369 days

1. Hypophysectomized.

2. For a discussion of structure see Fieser and Fieser, 1949.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1130.--PREGNANEDIOL (Continued) 								
McEuen, 1936	2 rats	---	F	0.2% in corn oil	Uterine horn	0	---	---
	--do--	---	F, castr.	--do--	--do--	0	---	---
Bachmann, et al., 1937	20 mice	Stock	---	0.3%[1] in alcohol twice weekly	Skin	0	16 alive at 6 mos., 9 alive at 1 year	431 days
1131.--PROGESTERONE 								
Gardner and Hill, 1936	3 mice	---	F	0.15 rabbit units[2] weekly	S.C.	0	---	22 to 70 days
	2 mice	---	M	--do--	S.C.	0	---	22 to 59 days
Alexin, 1939	15 rats	---	F, normal and castr.	2 mg. daily	Inj.	0	---	90 days
	5 rats	---	F, castr.	2 mg. twice weekly	Inj.	0	---	360 days
Laccassagne, 1939b	5 mice	RIII	M & F	In olive oil	S.C.	0	---	482 days
	4 mice	30	--do--	--do--	S.C.	0	---	590 days
Silvestroni, 1939	5 rats	---	F, castr.	1 r.u. in oil daily for 28 days	Inj.	Tumors[3]	---	---
Sosa Gallardo, 1940	4 rats	---	M & F	5 mg. in sesame oil daily	Inj.	0	---	9 weeks
Courrier and Bennetz, 1941	Mice	---	M[4]	50-100 mg. in 20 days	---	---	---	Ca. 8 weeks
	--do--	---	M[4]	100 mg. in 20 days	---	---	---	--do--
Forbes, 1941	18 rats	---	M & F	Pellets, 6-10 mg.	S.C.	0	---	At least 88 days
Hartman and Speert, 1941	4 monkeys	Rhesus	F, castr.	5-20 mg. daily	S.C.	0	---	At least 32 days
Shimkin and White, 1941	14 mice	A & C3H	M	Cholesterol[5] pellets 25 and 100%, 4.3-5.0 mg.	S.C.	0	---	70 days

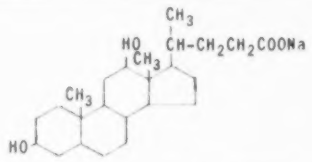
1. M.p. 235°.
2. Crude product used.
3. Nuclear changes, rare vacuoles, very little mitosis.
4. Some castrated.
5. M.p. 128-9°.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1131.--PROGESTERONE (Continued) 								
Silberberg and Silberberg, 1941a	20 guinea pigs		M & F	0.65 and 1 rabbit unit in sesame oil, 6 times weekly	S.C.	0	---	8 weeks
Chamorro, 1943b	6 mice	---	---	5 mg. daily 22 times	I.P. & S.C.	0	---	Ca. 5 weeks
	4 rats	---	---	15 mg. daily 20 times	--do--	0	---	--do--
	--do--	Wistar	Castr.	2 mg. daily in olive oil	S.C. & I.P.	0	---	Ca. 4 weeks
Bogart et al., 1944	15 rats	---	F	0.5 mg. in peanut oil daily	S.C.	0	---	At least 3 mos.
Heiman, 1945	48 mice	RIII	F	0.2 or 1.0 mg. in peanut oil every 6 or 10 days 4-18 times	S.C.	8[1]	---	20-34 mos.
Bischoff and Rupp, 1946	35 mice	Marsh-Buffalo	F, castr.	10 mgm. in sesame oil	S.C.	0	---	At least 6 mos.
	38 mice	--do--	--do--	--do--[2]	S.C.	21%	---	--do--
	--do--	--do--	F	--do--[2]	S.C.	11%	---	--do--
Burrows and Hoch-Ligeti, 1946	30 mice	C3H	F	1 mgm. in arachis oil weekly	S.C.	Tumors[3]	---	At least 230 days
1132.--SARSASAPOGENIN 								
Smith and Gardner, 1939	11 mice	---	M	1% in sesame oil, 0.1 cc. twice weekly, 10 inj.	S.C.	0	6 alive at 100 days	642 days
1133.--SCILLAREN A 								
Smith and Gardner, 1939	6 mice	---	M	1% in sesame oil, 0.1 cc. twice weekly, 10 inj.	S.C.	0	5 alive at 100 days	458 days

1. Mammary cancer; spontaneous rate 54%. First carcinomas at 3 weeks. Other animals also injected with progesterone and testosterone propionate.
2. Crude product used.
3. Mammary.

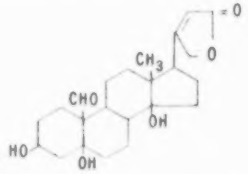
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

1134.--SODIUM DESOXYCHOLATE



Law, 1941d	20 mice Mice	A C3H, C57 bl., and AW	M & F ---	10 mg. (total dose) ---do---	S.C. ---do---	1 sarc.[1] 0	--- ---	9 mos. 10 mos.

1135.--STROPHANTHIDIN

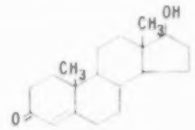


Smith and Gardner, 1939	10 mice	---	M & F	.3 in sesame oil, 0.1 cc. twice weekly, 10 inj.	S.C.	0	7 alive at 150 days	150 days

1136.--STROPHANTHIN-k[2]

Smith and Gardner, 1939	2 mice	---	M	.15 in sesame oil, 0.1 cc. twice weekly, 10 inj.	S.C.		1 alive at 100 days	422 days

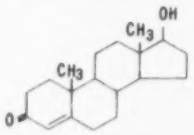
1137.--TESTOSTERONE



Moore and Price, 1932	14 rats	---	M	2 to 25 bird units[3] daily	inj.	0	---	10 to 62 days
Kinosita, 1937[4]	Rat	---	---	In cholesterol	Liver	0	---	---
	--do--	---	---	--do--	Kidneys	0	---	---
	Rabbit	---	---	--do--	Under periosteum	0	---	---
	--do--	---	---	--do--	Bone marrow	0	---	---
	--do--	---	---	--do--	Brain	0	---	---
	Pigeon	---	---	--do--	--do--	0	---	---
	Toad	---	---	--do--	I.M.	0	---	---
Bottomley and Folley, 1938	4 guinea pigs	---	M	.2 mg. in sesame oil daily	inj.	0	---	32 days
	5 guinea pigs	---	M	--do--	inj.		---	27 days

1. At site (?); also higher incidence of lung tumors than in controls.
2. For a discussion of structure see Fieser and Fieser, 1949.
3. Crude product used.
4. Substance called "androstin," an impure product consisting chiefly of testosterone.

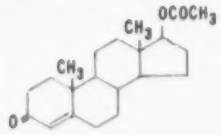
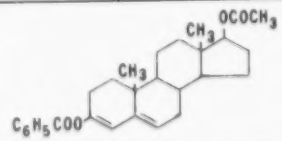
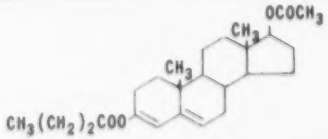
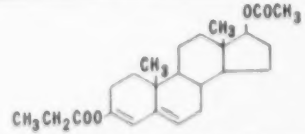
1137.--TESTOSTERONE (Continued)



Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Korenchevsky and Hall, 1938	Rats	---	M, castr.	0.75 to 7.5 mg. weekly	Inj.	0	---	2.5 to 4 mos.
Deanesly, 1939b	2 rabbits	---	M	29 and 44 mg. resp. as pellets	S.C.	0	---	30 and 37 days
	1 rabbit	---	M, castr.	7.5 mg. in oil, total dose	S.C.	0	---	30 days
	4 rabbits	---	--do--	84-242 mg. as pellets	S.C.	0	---	23 to 75 days
Korenchevsky and Hall, 1939	9 rats	---	M	0.75 mg. or 7.5 mg. in sesame oil, total dose weekly	Inj.	0	---	90 to 114 days
Korenchevsky et al., 1939c	4 rats	---	M, castr.	0.15 mg. in sesame oil 5 times weekly	Inj.	0	---	Ca. 105 days
	--do--	---	--do--	1.5 mg. in sesame oil 5 times weekly	Inj.	0	---	--do--
McEuen, 1939	11 rats	White	M, normal and castr.	200 micrograms in corn oil daily	S.C.	1[1]	---	900-1,000 days
	12 rats	--do--	F, normal and castr.	--do--	S.C.	2[2]	---	--do--
Chu, 1940	4 pigeons		M	2 mg. in sesame oil daily	Inj.	0	---	30 days
Pfeiffer et al., 1940	12 mice	C57 and NH hybrids	M	1.25 mg. in sesame oil weekly for 4 weeks	S.C.	0	---	--do--
Vest et al., 1940	1 monkey	Macaque	M, castr.	Pellet (409.5 mg. in 2 pellets)	I.M.	0	---	3.5 mos.
Forbes, 1941	20 rats	---	M & F	6-10 mg.	S.C.	0	---	At least 31 days
Korenchevsky, 1941	Rats	---	M, castr.	0.75 or 7.5 mg. weekly	Inj.	0	---	3.5 mos.
Selye and Friedman, 1941	6 mice	dba	---	5 mg. in peanut oil daily	Inj.	0	---	40 days
Tyslowitz and Dingemanse, 1941	1 dog	---	M	5-10 mg. daily	Inj.	0	---	83 days
Hooker, 1942	128 rats		M	5-80 micrograms in 0.025 -0.1 cc. of sesame oil	S.C.	0	---	Ca. 120 days
Kochakian, 1945	22 mice	Murray-Little dba	Castr.	0.14-16.2 mgm. monthly absorbed from pellets	Implanted	0	---	60 days

1. Fibrosarcoma; also 5 other animals developed tumors at other sites.

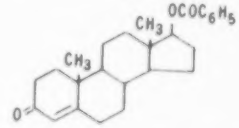
2. Fibrous tissue tumors; also 2 other animals developed tumors at other sites. Of 12 controls, one developed a tumor at site of injection.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1138.--TESTOSTERONE ACETATE 								
Miescher et al., 1936	Fowls	---	M, castr.	50 micrograms in sesame oil daily for 6 days	S.C.	0	---	30 days
Lacassagne, 1937c	5 mice	R3	M & F	500 and 1,000 micrograms weekly	Inj.	2[1]	---	16 mos.
Miescher, 1937a	Fowls	---	M, castr.	50 micrograms daily for 6 days	Inj.	0	---	30 days
Lacassagne, 1939b	6 mice	R111	M & F	In olive oil	S.C.	2 sarc.[2]	---	609 days
Lacassagne and Raynaud, 1939b	Mice	R3	F	1 to 2 mg. in oil twice weekly	Inj.	0	High mortality but 4 alive at 11 mos.	18 mos.
Lacassagne and Raynaud, 1939c	21 mice	---	M & F	1 to 2.5 mg. in oil every 2 weeks[3]	Inj.	2 sarc.[4]	---	193 to 344 days
1139.--TESTOSTERONE ACETATE 3-ENOLBENZOATE 								
Miescher et al., 1938a	Rats	---	M, castr.	2 mg.	Inj.	0	---	49 days
1140.--TESTOSTERONE ACETATE 3-ENOL-n-BUTYRATE 								
Miescher et al., 1938a	Rats	---	M, castr.	2 mg.	Inj.	0	---	44 days
1141.--TESTOSTERONE ACETATE 3-ENOLPROPIONATE 								
Miescher et al., 1938a	Rats	---	M, castr.	2 mg.	Inj.	0	---	39 days

1. Mammary adenocarcinoma.
2. In males.
3. With 2 to 5% estrone benzoate injected either simultaneously or separately.
4. Also mammary adenocarcinomas.

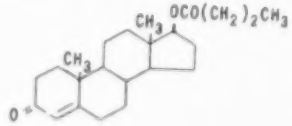
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

1142.--TESTOSTERONE BENZOATE



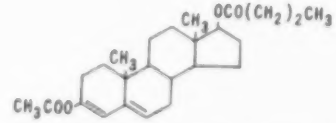
McEuen et al., 1945	12 rats	---	M, castr.	---	---	0	---	45 to 56 days
	6 rats	---	F, normal and castr.	200 and 400 micrograms daily for 11 days	S.C.	0	---	---
Kochakian, 1945	2 mice	Murray-Little dba	---	Pellets 0.9 mgm. monthly absorbed	Implanted	0	---	60 days

1143.--TESTOSTERONE n-BUTYRATE



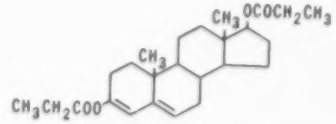
Mlescher et al., 1936	Fowls	---	M, castr.	50 or 100 micrograms in sesame oil daily for 6 days	S.C.	0	---	30 days
	Rats	---	M, castr.	1 mg. in sesame oil, 2 injections	S.C.	0	---	31 days
Mlescher, 1937a	Fowls	---	--do--	50 or 100 micrograms daily for 6 days	Inj.	0	---	30 days
	Rats	---	--do--	2 mg.	--do--	0	---	31 days

1144.--TESTOSTERONE n-BUTYRATE 3-ENOLACETATE



Mlescher et al., 1938a	Rats	---	M, castr.	2 mg.	Inj.	0	---	70 days

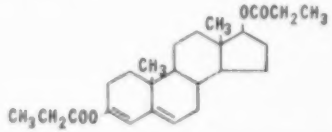
1145.--TESTOSTERONE ENOLDIPROPIONATE



Mlescher, 1938	Rats	---	M, castr.	1-8 mg. single injection	S.C.	0	---	68 days
Mlescher et al., 1938a	--do--	---	--do--	2 mg.	Inj.	0	---	40 days

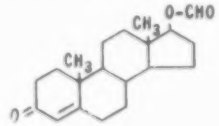
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

1145.--TESTOSTERONE ENOLDIPROPIONATE (Continued)



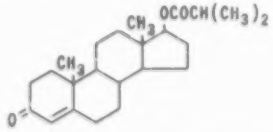
Korenchevsky and Hall, 1940	6 rats	---	F, castr.	7.5 mg. weekly	Inj.	0	---	53-146 days
Marine and Rosen, 1941	12 fowls	White Leghorn	M, castr.	Variable units twice weekly	Inj.	0	---	6 mos.
Vest et al., 1941	1 monkey	Macaque	M, castr.	2 pellets successively, 214 and 290 mg.	S.C.	0	---	90 days

1146.--TESTOSTERONE FORMATE



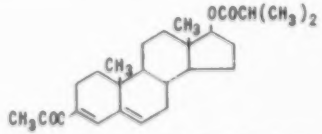
Miescher et al., 1936	Fowls	---	M, castr.	50 micrograms in sesame oil daily for 6 days	S.C.	0	---	30 days
Miescher, 1937a	--do--	---	--do--	50 micrograms for 6 days	Inj.	0	---	--do--

1147.--TESTOSTERONE ISOBUTYRATE



Miescher et al., 1936	Fowls	---	M, castr.	10 micrograms in sesame oil daily for 6 days	S.C.	0	---	30 days
Miescher, 1937a	Fowls	---	M, castr.	100 micrograms daily for 6 days	Inj.	0	---	30 days
	Rats	---	--do--	2 mg.	Inj.	0	---	31 days
Miescher et al., 1938a	--do--	---	--do--	2 mg.	Inj.	0	---	36 days

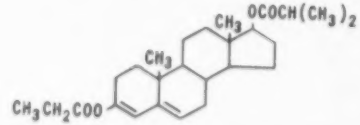
1148.--TESTOSTERONE ISOBUTYRATE 3-ENOLACETATE



Miescher et al., 1938a	Rats	---	M, castr.	2 mg.	Inj.	0	---	46 days

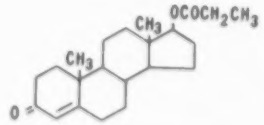
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

1149.--TESTOSTERONE ISOBUTYRATE 3-ENOLPROPIONATE

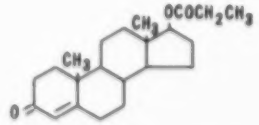


Miescher et al., 1938a	Rats	---	M, castr.	2 mg.	Inj.	0	---	50 days

1150.--TESTOSTERONE PROPIONATE

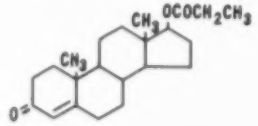


Miescher et al., 1936	Fowls	---	M, castr.	50 micrograms in sesame oil daily for 6 days	S.C.	0	---	30 days
Miescher, 1937a	Fowls	---	--do--	50 micrograms daily for 6 days	Inj.	0	---	--do--
	Rats	---	--do--	2 mg.	Inj.	0	---	51 days
Bottomley and Folley, 1938	5 guinea pigs	---	M	2.36 mg. in sesame oil daily	Inj.	0	---	32 days
	4 guinea pigs	---	M, castr.	--do--	Inj.	0	---	--do--
	5 guinea pigs	---	M	--do--	Inj.	0	---	27 days
Korenchevsky and Hall, 1938	Rats	---	M & F, castr.	0.75 to 7.5 weekly	Inj.	0	---	2.5 to 4 mos.
Miescher, 1938	Rats	---	M, castr.	5-16 mg. single injection	S.C.	0	---	50 days
Zuckerman, 1938b	8 monkeys	Rhesus	M	Up to 400 mg. during 2 weeks	---	0	---	2 weeks
	1 drill	---	M	5 g. during 191 days	---	0	---	191 days
	2 Hanuman langurs	---	M	1 and 2 gm. respectively (total dose)	---	0	---	142 and 157 days
Zuckerman and Parkes, 1938	1 monkey	Macacus mulatta	M, castr.	242.5 mg. total dose	Inj.	0	---	91 days
Folley et al., 1939	6 monkeys	Rhesus	M	0.2 to 1.69 g.	Inj.	0	---	13 to 151 days
Groome, 1939	2 guinea pigs	---	F, castr.	2-5 mg. in a single crystal	I.M.	0	---	30 days
Biddulph, 1939	12 rats	---	M	2 micrograms daily	Inj.	0	---	44 days
	Rats	---	M	10 micrograms daily, for 31 days	--do--	0	---	61 days
	23 rats	---	M	10 micrograms daily, 1 injection	--do--	0	---	31-81 days
	18 rats	---	M	10-100 micrograms daily	--do--	0	---	84 days

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1150.--TESTOSTERONE PROPIONATE (Continued) 								
Korenchevsky and Hall, 1939	8 rats[1]	---	M	0.75 or 7.5 in sesame oil total dose weekly	Inj.	0	---	90 to 118 days
	6 rats	---	M	7.5 mg. in sesame oil total dose weekly	--do--	0	---	--do--
Korenchevsky et al., 1939b	7 rats	---	F, castr.	0.45 mg. in sesame oil 5 times weekly	--do--	0	---	Cá. 109 days
	4 rats	---	--do--	1.5 mg. in sesame oil 5 times weekly	--do--	0	---	--do--
	2 rats	---	F	0.15 mg. in sesame oil 5 times weekly	--do--	0	---	--do--
	--do--	---	F	1.5 mg. in sesame oil 5 times weekly	--do--	0	---	--do--
Korenchevsky et al., 1939c	6 rats	---	M, castr.	0.15 mg. in sesame oil 5 times weekly	Inj.	0	---	Ca. 105 days
	7 rats	---	--do--	1.5 mg. in sesame oil 5 times weekly	Inj.	0	---	--do--
Lacassagne, 1939a	6 mice	RIII	F	1 mg. twice weekly	--do--	3[2]	---	6.5 mos.
Lacassagne, 1939b	7 mice	-do--	F	In olive oil	S.C.	5 sarc.	---	497 days
	9 mice	17 nc, 30 and 39	M & F	--do--	S.C.	1[3]	---	966 days
Lacassagne and Raynaud, 1939a	13 mice	R3	M & F	7.5 to 114 mg. total dose	Inj.	0	---	31 to 448 days
Lipschütz et al., 1939e	10 guinea pigs	---	F, castr.	1.25 mg. weekly	S.C.	0	---	103 days
Nathanson and Andervont, 1939	20 mice	C3H	F	0.5 mg. in sesame oil 3 times weekly for 4 mos.	---	0[4]	10 alive at 16 mos.	16 mos.
Ruz Orrego, 1939	8 guinea pigs	---	F	84-840 micrograms in sesame oil thrice weekly	S.C.	0	---	Ca. 57 days
	12 guinea pigs	---	F, castr.	0.42-1.25 mg. 1-3 times	--do--	0	---	53 days
	--do--	---	--do--	0.42-6 mg. 1-6 times	--do--	0	---	43 days
Silvestroni, 1939	10 rats	---	F, castr.	1 mg. in oil daily for 40 days	Inj.	0[5]	---	40 days
	5 rats	---	F	1 mg. in oil daily for 17 days	--do--	0[6]	---	17 days
Wolfe and Hamilton, 1939	16 to 24 rats	---	F	0.1 to 1 mg. in peanut oil daily	Inj.	0	---	90 days
Zuckerman and Parkes, 1939	1 Hamadryas baboon	---	M, castr	100 mg. weekly	Inj.	0	---	54 weeks
	1 drill	---	M	50 to 300 mg. weekly for 23 weeks	--do--	0	---	23 mos.
	2 Hanuman langurs	---	M	0.985 and 1.985 mg. (total dose)	--do--	0	---	142 and 157 days

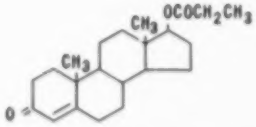
1. Senile, 5 with pneumonia.
2. Mammary carcinoma.
3. Of the uterus.
4. Spontaneous mammary tumors obtained.
5. Changes in epithelial cells.
6. Hypertrophy of uterus.

1150.--TESTOSTERONE PROPIONATE (Continued)

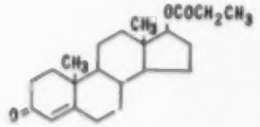


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Catuly, 1940	4 rats[1]	---	M, normal and castr.	1-4.5 mg. pellets	---	0	---	21-35 days
Gardner et al., 1940	11 mice	C3H	---	1.25 micrograms in sesame oil twice	S.C.	0	11 alive at 150 days	479 days
Kochakian, 1940	Mice	dba	M & F	0.2 or 0.4 mg. in sesame oil daily	S.C.	0	---	At least 200 days
Korenchevsky and Hall, 1940	7 rats	---	F, castr.	2.25 mg. weekly	Inj.	0	---	53-146 days
	4 rats	---	--do--	7.5 mg. weekly	Inj.	0	---	--do--
	6 rats	---	--do--	7.5 mg. weekly	--do--	0	---	--do--
	2 rats	---	M	2.25 mg. weekly	--do--	0	---	--do--
	2 rats	---	M	7.5 mg. weekly	--do--	0	---	--do--
Lorenz, E. and Stewart, 1940a	5 mice	A, backcross	M	0.1 mg. in sesame oil twice weekly for 9 weeks and weekly for 24 weeks	S.C.	0	---	42 weeks
Persike, Jr., 1940	Rats	---	M & F	0.01-0.08 mg. in sesame oil daily	I.P.	0[2]	---	Not over 100 days
Pfeiffer et al., 1940	36 mice	C57 & NH hybrids	M	1.25 mg. in sesame oil weekly for 4 weeks	S.C.	0	---	30 days
Rubinstein and Solomon, 1940a	12 rats	Wistar	M	0.05 mg. daily	I.P.	0[3]	---	53 days
Rubinstein and Solomon, 1940b	49 rats	---	M, castr.	50 micrograms daily	S.C.	0	---	80 days
Selye, 1940	5 rats	Albino	F	1 mg. in peanut oil daily	I.P. & S.C.	0	---	30 days
Stone, 1940	32 rats	---	M	0.62 mg. in sesame oil	S.C.	0[4]	---	85 days
Vest et al., 1940	2 monkeys	Macaque	M, castr.	25 mg. in oil every 3-7 days	I.M.	0	---	121 and 138 days
	1 monkey	--do--	--do--	Pellet (492 mg. in 2 pellets)	Omentum	0	---	100 days
Wentworth et al., 1940	5 mice	---	M	62.5-78.75 mg. (total dose) in sesame oil	S.C.	0	---	At least 434 days
Biskind, 1941b	5 rats	---	F	Pellets	S.C.	0	---	60 days
	10 rats	---	F	--do--	Spleen	0	---	--do--

1. Also 3 hypophysectomized.
2. Effect on thymus studied.
3. Growth studied.
4. Copulatory activity studied.

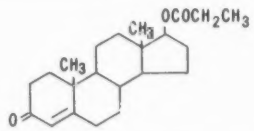
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1150.--TESTOSTERONE PROPIONATE (Continued) 								
Bradbury, 1941	16 rats	---	F	0.25 mg. every 2 days, 9 times	Inj.	0	7 alive at 6 mos.	6 mos.
Deanesly and Parkes, 1941	5 rats	---	M	Pellets of avg. wt. ca. 20 mg.	S.C.	0	---	14 weeks
Forbes, 1941	16 rats	---	M & F	Pellets, 6-10 mg.	S.C.	0	---	At least 61 days
Huffman, 1941	19 rats	Wistar	F	2 mg. in sesame oil daily for 4 weeks	Inj.	0	---	Over 58 days
Jones, 1941	14 mice[1]	C3H	F	1-1.5 mg. in oil weekly	S.C.	0[2]	---	45 weeks
	16 mice[3]	--do--	F	1 mg. in oil weekly	S.C.	0[4]	---	4 mos.
Korenchevsky, 1941	Rats	---	M, castr.	0.75 or 7.5 mg. weekly	Inj.	0	---	Ca. 3.5 mos.
Kochakian, 1941	12 mice	Marsh-Buffalo	M, castr.	Pellets, ca. 11 or 22 mg.	S.C.	0	---	96 days
Loeser, 1941	10 mice	A	F	Pellets, 7-8 mg. every 3-5 weeks	S.C.	0[5]	---	10½ mos.
Ludden et al., 1941b	7 rabbits	---	M & F	10 mg. in sesame oil daily for one week, then thrice weekly	I.M.	0	---	14 weeks
Ludden et al., 1941a	6 rats	Wistar	M	1 mg. in sesame oil daily	S.C.	0	---	42 days
Mark and Biskind, 1941	5 rats	---	F	Pellets, 1.9-4.0 mg.	S.C.	0	---	36 days
	--do--	---	F	Pellets, 2.3-2.8 mg.	--do--	0	---	231 days
	4 rats	---	F, castr.	Pellets	--do--	0	---	115 days
	37 rats	---	M, normal and castr.	Pellets	S.C.	0	---	140 days
Rubinstein and Kurland, 1941	98 rats	---	M	5 micrograms to 2.5 mg. in sesame oil daily for 10-79 days	S.C. or I.P.	0	---	80 days
Rubinstein and Solomon, 1941a	15 rats	Wistar	M, castr.	1 mg. in sesame oil daily	I.P.	0	---	54 days
Rubinstein and Solomon, 1941b	15 rats	Wistar	M, castr.	50 micrograms in sesame oil daily	I.P.	0	---	54 days
Shay et al., 1941a	14 rats	--do--	M	1 mg. thrice weekly in sesame oil	---	0	---	298 days

1. Young virgin.
2. Lowered incidence of spontaneous mammary tumors.
3. Older breeding.
4. Lowered incidence or delay in appearance of mammary tumors.
5. 4 mammary tumors -- a reduction in this tumor compared with controls.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1150.--TESTOSTERONE PROPIONATE (Continued) 								
Shay et al., 1941a (Continued)	5 rats	Wistar	M	1 mg. thrice weekly in sesame oil for at least 54 weeks	---	0	---	At least 16 mos.
	12 rats	--do--	M	5 mg. in sesame oil 6 times weekly for ca. 30 days	---	0	---	Ca. 6½ weeks
	5 rats	--do--	M	5 mg. in sesame oil 6 times weekly for 60 days	---	0	---	60 days
	9 rats	--do--	M	5 mg. in sesame oil daily for 30 days	---	0	---	30 days
Shay et al., 1941b	60 rats	Wistar	M & F	1 mg. in sesame oil thrice weekly	S.C.	0	---	40 weeks
	45 rats	--do--	--do--	5 mg. in sesame oil daily for 30-60 days	S.C.	0	---	9 weeks
Shimkin and White, 1941	28 mice	A & C3H	M	Cholesterol pellets, 10-100%, 3.2-3.7 mg.	S.C.	0	---	70 days
Silberberg and Silberberg, 1941a	17 mice 15 mice 4 mice	C57 D AKA	F	0.25 or 0.75 mg. weekly	S.C.	0	---	19 mos.
Turner et al., 1941	38 rats	---	M, normal and castr.	0.25 or 1 mg. in sesame oil daily	S.C.	0	---	80-135 days
Tyslowitz and Dingemanse, 1941	1 dog	---	M	10 mg. daily	Inj.	0	---	81 days
Vest et al., 1941	1 monkey	Macaque	M, castr.	Pellet, 386 mg.	S.C.	0	---	42 days
Wainman and Shipounoff, 1941	15 rats	Long-Evans	M, normal and castr.	200 or 500 micrograms in sesame oil daily for 35 days	S.C.	0	---	95 days
Wilson et al., 1941	45 rats	---	F	16 mg. in peanut oil thrice weekly for 4 weeks	S.C.	0	---	3-5 weeks
Wolfe, 1941	25 rats	---	M	1 or 2 mg. in oil daily	Inj.	0	---	90 days
Forbes, 1942	19 or 20 rats	---	M & F	Pellets	S.C.	0	---	At least 55 days
Laqueur and Fluhmann, 1942	9 rats	Stanford	F	1 mg. in sesame oil thrice weekly	S.C.	0	---	30-90 days
Ludden et al., 1942	11 rabbits	---	M & F	10 mg. thrice weekly	Inj.	0	---	100 days
Moore and Morgan, 1942	22 opossums	---	M	0.5-5.0 mg. in sesame oil daily	S.C.	0[1]	---	99 days
Wainman et al., 1942	55 rats	Long-Evans	M	0.2 or 0.5 mg. in sesame oil daily	S.C.	0	---	35 days

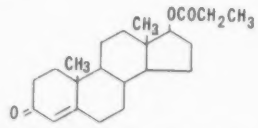
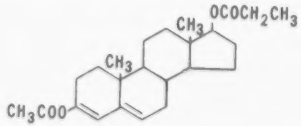
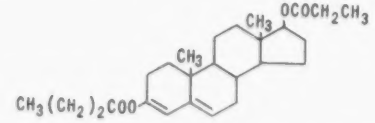
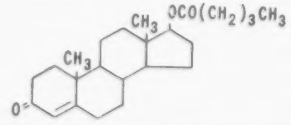
1. Effect on testicular response.

1150.--TESTOSTERONE PROPIONATE (Continued)

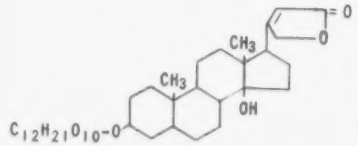


Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Schenken and Burns, 1943	48 mice	C3H	M & F	0.25-1.25 mg. in sesame oil weekly	S.C.	2[1]	---	Death
Gardner et al., 1944	41 mice	--do--	---	0.625-2.5 mg. in sesame oil weekly	S.C.	0	---	---
	12 mice	CBA	---	--do--	S.C.	1[2]	---	---
	--do--	C123	---	--do--	S.C.	0	---	---
Heiman, 1944	96 mice	RIII	F	0.5-1 mg. in peanut oil every 2 weeks, 9-16 times	S.C.	0[3]	---	15.6 mos.
	12 mice	--do--	F	1 mg. in peanut oil every 2 weeks, 18 times	Skin	0[3]	---	15 mos.
Kirkpatrick and Andrews, 1944	35 pheasants	Ring-necked	M, normal and castr.	0.3 mg. daily for 20 days	Inj.	0	---	4½ mos.
Kochakian and Fox, 1944	12 mice	Marsh-Buffalo	M	6.8-8.0 mg. pellets	S.C.	0	---	35 days
	--do--	--do--	M	12.8-13.7 mg. pellets	S.C.	0	---	115 days
Laqueur, 1944	61 rats	Wistar	F	1 mg. in oil thrice weekly	S.C.	0	46 alive at 232 days	232 days
Murphy, 1944	36 mice	R.I.L.	F, castr.	3 mg. pellets	S.C.	Leukemia[4]	---	Over 270 days
Wolfe et al., 1944	20 rats	---	M & F	6 or 36 mg. in 12 injections	S.C.	0	---	103 days
Heiman, 1945	24 mice	RIII	F	6 mgm. plus 6 mg. in peanut oil	S.C.	0[5]	---	At least 2 years
Kochakian, 1945	18 mice	Murray-Little dba	Castr.	1-2 pellets, 0.20-9.40 mgm. monthly absorbed	Implanted	0	---	60 days
Chu and You, 1946	8 pigeons	---	M	2 mg. in 0.5 ml. sesame oil daily	Inj.	0	---	Ca. 56 days
Valle and Leal Prado, 1946	2 dogs	Fox terrier	M, castr.	81-141 mg.	S.C.	0	All killed	8-10 mos.
	4 dogs	--do--	F, castr.	160-345 mg.	S.C.	0	--do--	--do--
Andervont and Dunn, 1947c	Mice	C	M & F, castr.	---	---	Tumors[6]		
Flaks, 1947	180 mice	CBA, C3H br, Strong A & Stock	F	6.25 mg. of 2.5% soln. in arachis oil weekly (total 12.5-75.0 mg.)	Inj.	0	---	Ca. 12 weeks

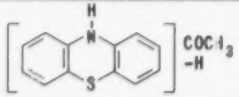
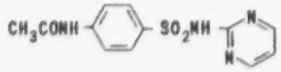
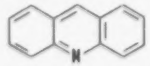
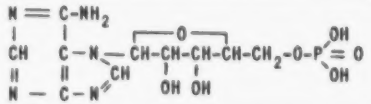
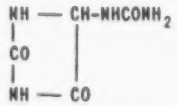
1. Of the liver, both in females -- not far from spontaneous incidence in controls.
2. Lymphoid.
3. Reduced incidence of spontaneous mammary tumors.
4. Lower incidence than in controls.
5. Testosterone propionate plus progesterone gave no tumors but substances given alternately produced 3 tumors.
6. Hemangioendotheliomas mainly.

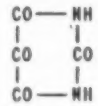
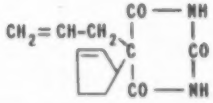
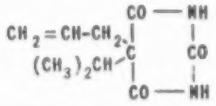
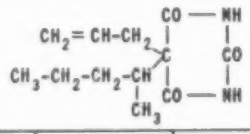
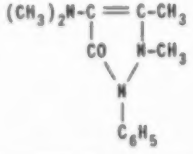
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1150.--TESTOSTERONE PROPIONATE (Continued) 								
Kirby, 1947	5 rats	Wistar	M[1]	20 mg. in pellets every 2 mos.	S.C.	0	---	348-373 days
Pfeiffer, 1947	7 birds	English sparrow	M	0.25 mg. daily 4-11 weeks	I.M.	0	---	Ca. 80 days
Wislocki et al., 1947	21 deer	Virginian	M & F	350 mg. in slugs	By air pistol	0	---	At least 2 years
1151.--TESTOSTERONE PROPIONATE 3-ENOLACETATE 								
Miescher et al., 1938a	Rats	---	M, castr.	2 mg.	Inj.	0	---	38 days
1152.--TESTOSTERONE PROPIONATE 3-ENOL-n-BUTYRATE 								
Miescher et al., 1938a	Rats	---	M, castr.	2 mg.	Inj.	0	---	55 days
1153.--TESTOSTERONE n-VALERATE 								
Miescher et al., 1936	Rats	---	M, castr.	1 mg. in sesame oil, 2 injections	S.C.	0	---	31 days
Miescher, 1937a	--do--	---	--do--	2 mg.	Inj.	0	---	--do--

1. Virgin males and mated males.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1154.--UZARIN 								
Smith and Gardner, 1939	6 mice	---	M	1% in [illegible] same oil, 0.1 cc. twice weekly, 10 injections	S.C.	0	6 alive at 100 days	679 days

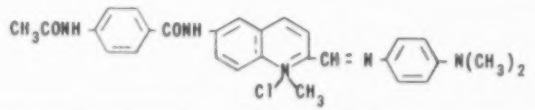
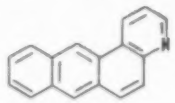
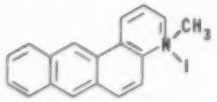
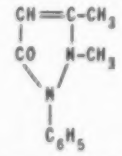
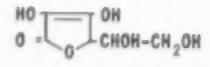
B.--ORGANIC COMPOUNDS 10.--HETEROCYCLIC

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1155.--ACETYL PHENOTHIAZINE 								
Green, 1941	Mice	---	---	In food	P.O.	---	---	11 mos.
1156.--ACETYLSULFADIAZINE 								
Endicott et al., 1944	60 rats	Aistar & Osborn-Mendel	---	1% level in food	P.O.	0	---	At least 30 days
1157.--ACRIDINE 								
Kennaway, 1924a	100 mice	---	---	In lanolin	Skin	0	Large proportion lived	9 mos.
	--do--	---	---	1% in "90% benzol"	--do--	0	--do--	--do--
Kennaway, 1924b	--do--	---	---	In lanolin	--do--	0	--do--	--do--
	--do--	---	---	1% in "90% benzol"	--do--	0	--do--	--do--
Kennaway, 1924c	Mice	---	---	---	--do--	0	---	---
Maisin et al., 1927	--do--	---	---	---	--do--	0	---	2 years
1158.--ADENYLIC ACID 								
Heinlein, 1938	Cats	---	---	---	---	0	---	Rather long period
1159.--ALLANTOIN 								
Shear and Leiter, 1941b	20 mice 3 mice	A dba	M	10 mg. crystals, repeated inj.	S.C.	0	17 alive at 1 year, 7 alive at 15 mos.	18 mos.

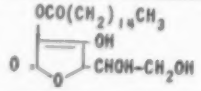
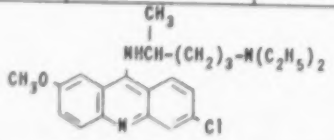
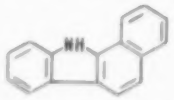
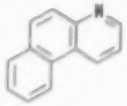
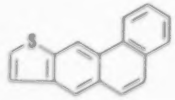
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1160.--ALLOXAN 								
Brunschwig and Allen, 1944	1 dog	---	---	50 mg. per kg. body wt., thrice	I.V.	0	---	31 days
Hughes and Hughes, 1944	8 rats	---	---	1-125 mg. per kg. body wt. daily	S.C.	0	---	1-2 mos.
1161.--5-ALLYL-5-Δ^2-CYCLOPENTENYL BARBITURIC ACID, Sodium Salt  **Na salt**								
Vander Brook and Cartland, 1944	20 rats	---	M & F	25 mg. per cc. water thrice weekly	P.O.[1]	0	13 alive at 28 weeks	28 weeks
	4 dogs	---	--do--	50 mg. per cc. water thrice weekly	--do--	0	All alive at 23 weeks	23 weeks
1162.--5,5-ALLYL-ISOPROPYLBARBITURIC ACID, Sodium Salt  **Na salt**								
Larsen et al., 1946	43 mice	A	---	0.05 mg. per gm. in 0.01 ml. aqueous soln. weekly for 13 weeks	I.P.	Tumors[2]	---	At least 13 weeks
1163.--5,5-ALLYL-(1-METHYLBUTYL)-BARBITURIC ACID, Sodium Salt  **Na salt**								
Larsen et al., 1946	38 mice	A	---	0.05 mg. per gm. in 0.01 ml. aqueous soln. weekly for 13 weeks	I.P.	Tumors[2]	---	At least 13 weeks
1164.--AMINOPYRINE 								
Boughton and Stoland, 1943	9 rats	Wistar	---	In food	P.O.	0	1 dead in 66 weeks	66 weeks

1. By stomach tube.

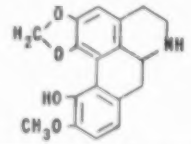
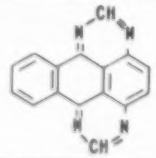
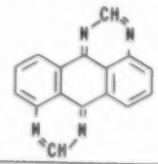
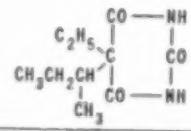
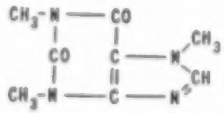
2. Of the lung, not greater than in controls.

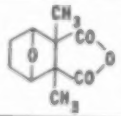
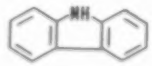
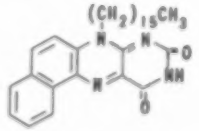
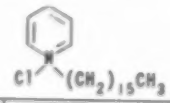
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1165.--ANIL 421 								
McCluskie and Niven, 1938	2 mice	---	F	1:150 in water[1] 1 cc. per 20 gm. body wt.	Inj.	2[2]	---	6 mos.
1166.--β-ANTHRAQUINOLINE 								
Joseph, 1939	100 mice	---	---	2%[3] in benzene; twice weekly for 5 mos.	Skin	0	---	7 mos.
	20 mice	---	---	0.02 g. in paraffin	S.C.	0	---	--do--
Sempronj and Morelli, 1939	11 rats	Wistar	---	8 to 10 mg. in lard; over 2 to 3 injections	S.C.	2[4]	8 died in 11 mos.	11 mos.
Shear and Leiter, 1941b	30 mice	C3H	M & F	5 plus 5 mg. crystals	S.C.	0	12 alive at 9 mos.	11 mos.
1167.--β-ANTHRAQUINOLINE METHIODIDE 								
Joseph, 1939	100 mice	---	---	2%[5] in benzene; twice weekly for 5 mos.	Skin	0	---	7 mos.
	20 mice	---	---	0.02 g. in paraffin	S.C.	0	---	--do--
1168.--ANTIPYRINE 								
Boughton and Stoland, 1943	9 rats	Wistar	---	In food	P.O.	0	3 dead in 66 weeks[6]	66 weeks
1169.--ASCORBIC ACID 								
Dobrovolskaia-Zavadskaia, 1943	8 mice	---	---	5%	S.C. & I.V.	8	4 alive at 112 days	Ca. 145 days
	7 mice	---	---	--do--	S.C.	7	---	--do--
	21 mice	---	---	1%	S.C.	21	---	--do--

1. Tends to be deposited at site.
2. Nodules at site, increasing in size.
3. M.P. 169°.
4. Of the kidney.
5. M.P. 221° dec.
6. No autopsies.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1170.--2-ASCORBYL PALMITATE 								
Fitzhugh and Nelson, 1944b	20 rats	Osborne-Mendel	M	2% and 5% in food	P.O.	0	2 died early	36 weeks
	--do--	--do--	M	.05% to 0.25% in food	P.O.	0	---	2 years
1171.--ATABRINE 								
Scudi and Hamlin, 1944	5 dogs	---	---	5-50 mg. per kg. body wt. in water daily	P.O.[1]	0	---	1.8-5.8 mos.
	4 dogs	---	---	10 mg. per kg. body wt. in water daily	--do--	0	---	4.8 mos.
Fitzhugh et al., 1945	85 rats	Osborne-Mendel	M & F	100-800 p.p.m. in food[2]	P.O.	0	---	5 mos.
	88 rats	--do--	--do--	--do--[3]	--do--	0	---	--do--
Mushett and Siegel, 1945	Foals & mammals	---	---	Large doses	---	0	---	---
1172.--1,2-BENZCARBAZOLE 								
Schürch and Winterstein, 1935	50 mice	---	---	0.5% in benzene for 145 days	Skin	3 epi.	---	300 days
1173.--5,6-BENZOQUINOLINE 								
Shear and Leiter, 1941b	30 mice	C3H	M	2 mg. crystals twice	S.C.	0	24 alive at 9 mos., 5 alive at 12 mos.	17 mos.
1174.--7,8-BENZTHIOPHANTHRENE 								
Berenblum, unpub. results[4]	12 mice	Stock	F	0.5% in benzene twice weekly	Skin	0	7 alive at 27 weeks	47 weeks
	--do--	--do--	M	2 mg. in 0.2 ml. tricaprylin	S.C.	0	8 alive at 6 mos.	62 weeks

1. By stomach tube.
2. Low protein diet.
3. High protein diet.
4. Synthesized by Robinson and Tilak (M.P. 79-81° C).

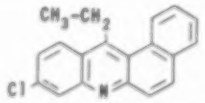
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1175.--BILIRUBIN $C_{33}H_{36}O_6N_4$								
Bomford, 1940	2 dogs	Mongrel	---	50 mg. in 0.1 Molar sodium carbonate soln. for 54 days, daily	I.V.	0	---	139 days
1176.--BULBOCAPNINE 								
Ottaviano and Papalardo, 1946	12 dogs --do--	--- ---	--- ---	30 mg. per kg. daily --do--	Inj. Inj.	0 0	--- ---	40 days --do--
1177.--1,9,4,10-BISPYRIMIDINO-ANTHRONE 								
Domagk, 1938	Mice	---	---	0.5% in solvent M and in water, 50 times	Skin	0	---	---
1178.--1,9,5,10-BISPYRIMIDINO-ANTHRONE 								
Domagk, 1938	Mice	---	---	0.5% in water, 50 times	Skin	0	---	---
1179.--sec-BUTYL ETHYL BARBITURIC ACID, Sodium Salt  Na salt								
Gruber, 1944	Rabbits & rats	---	---	Every other day	---	0	---	Several mos.
1180.--CAFFEINE 								
Boughton and Stoland, 1943	7 rats	Wistar	---	In food	P.O.	0	2 dead at 92 weeks	92 weeks
Roth and Ivy, 1944	20 cats	---	---	300 mg. as ca. 30% in beeswax-mineral oil daily	I.M.	0	5 alive at 33 days	39 days

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1181.--CANTHARIDINE 								
Berenblum, 1935	Mice	---	---	In acetone weekly, 3 times	Skin	0	---	1 mo.
Orr, 1938	---do---	---	---	0.25% in acetone weekly	---do---	0	---	At least 28 weeks
Mottram, 1944b	6 mice	Stock	---	0.5% in acetone	Skin	0	---	At least 20 weeks
1182.--CARBAZOLE 								
Bloch, 1922	Mice	---	---	---	Skin	0	---	---
Kennaway, 1924a	100 mice	---	---	1% in alcohol	---do---	0	---	9 mos.
Kennaway, 1924b	---do---	---	---	---do---	---do---	0	---	9 mos.
Kennaway, 1924c	Mice	---	---	---	---do---	0	---	---
Maisin et al., 1927	30 mice	---	---	Soln.[1] in benzene followed by mixture with lanolin	Skin	1[2]	---	Over 2 years
Schürch and Winterstein, 1935	50 mice	---	---	0.5% in benzene 3 times weekly	---do---	0	---	276 days
Shear and Leiter, 1941b	10 mice	A	M	10 mg. crystals repeated injections	S.C.	0	All alive at 1 year, 4 alive at 15 mos.	15 mos.
1183.--9-CETYL-5,6-BENZOFLAVIN 								
Lettré and Fernholz, 1940	Mice	---	---	In aq. susp. or in soln. in tributyrin or olive oil	S.C.	0	---	10 weeks
1184.--CETYL PYRIDINIUM CHLORIDE 								
Nelson and Lyster, 1946	102 rats	Sprague-Dawley	M	100-450 mg. per kg. daily	S.C.	0	---	At least 60 days
	92 rats	---do---	M	2.5-30 mg. per kg. daily	I.P.	0	---	---do---
	42 rats	---do---	M	15-30 mg. per kg. daily	I.T.	0	---	---do---
	72 rats	---do---	M	100-450 mg. per kg. daily	P.O.[3]	0	---	---do---

1. Substance yellowish and impure, M.P. 222-231°.
2. Sebaceous epithelioma.
3. By stomach tube.

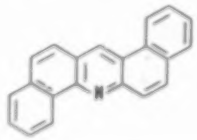
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

1185.--6-CHLORO-9-ETHYL-1,2-BENZACRIDINE



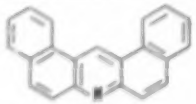
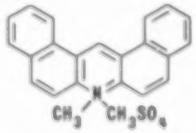
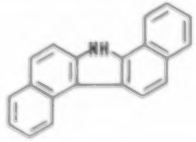
Lacassagne et al., 1946	10 mice	17	M & F	0.3% in acetone twice weekly	Skin	0	9 alive at 232 days	232 days

1186.--1,2,5,6-DIBENZACRIDINE

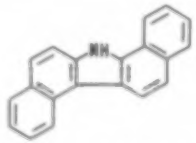
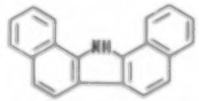
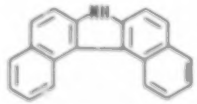


Cook, 1933a	40 mice	---	---	---	Skin	5 epi., 2 pap.	---	---
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	1 epi.	7 alive at 6 mos.	349 days
	30 mice	---do---	---	---do---	---do---	4 epi., 2 pap.	12 alive at 1 year	482 days
Rondoni and Corbellini, 1936	30 rats	---	---	1%[1] in benzene ca. thrice weekly[2]	---do---	0	---	10 mos.
Bachmann et al., 1937	19 mice	Stock	---	0.3% in sesame oil, 0.3 cc. every 2 weeks	inj., groin	8 sarc.[3]	13 alive at 168 days	240 days
Haddow et al., 1937	10 rats	Lister	M & F	30 mg. in sesame oil	I.P.	0	---	38 days
	9 rats	---do---	M & F	10 mg. in sesame oil	---do---	0	---	29 days
Orr, 1938	10 mice	Stock	---	0.3% in benzene weekly	Skin	0	---	18 weeks
	---do---	---do---	---	Saturated soln. in acetone	---do---	2	---	28 weeks
Andervont and Shimkin, 1940	10 mice	A	---	0.25 mg.[4] in eq. susp.	I.V.	3[5]	---	20 weeks
	20 mice	A	M & F	0.5 mg. in tricaprylin	S.C.	0[6]	---	14 weeks
	14 mice[7]	A	---	1 mg. in sesame oil	S.C.	---do---	---	40 weeks
Badger et al., 1940	40 mice	---	---	0.3% in benzene twice weekly	Skin	5 epi., 2 pap.	---	482 days
	9 mice	---	---	5 mg.[8] in sesame oil, repeated injections	S.C.	5 sarc.	---	234 days
	10 mice	---	---	5 mg.[9] in sesame oil, repeated injections	---do---	3 sarc.[10]	---	246 days
	10 mice	---	---	5 mg. weekly	P.O.	1[11]	---	627 days
Cook, 1940a	Mice	---	---	Ca. 5 mg. weekly	P.O.	0[12]	---	---

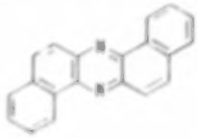
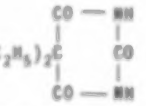
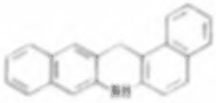
1. M.P. 228°.
2. After 185 days of treatment, some of the animals were heat-cauterized.
3. Arising between 168 and 240 days.
4. M.P. 227.0-227.8° Corr. (by J.L.H.)
5. Of the lung; first within 8 weeks.
6. No sarcoma, but all had lung tumors.
7. Effective total.
8. Less pure product.
9. Pure product.
10. One more possible.
11. Epithelioma and papilloma of stomach. This mouse had also epithelioma of neck and shoulder, epithelioma of both kidneys and lung adenomas. One other mouse also had stomach papillomas.
12. One possible cholangiomatous growth out of 6 livers examined.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1187.--1,2,7,8-DIBENZACRIDINE 								
Cook, 1933a	40 mice	---	---	---	Skin	9 epi., 4 pap.	---	---
Harry et al., 1935	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	2 epi.	6 alive at 6 mos., 3 alive at 1 year	597 days
	50 mice	--do--	---	--do--	--do--	2 pap., 9 epi.	28 alive at 6 mos., 18 alive at 1 year	551 days
Rondoni and Carbellini, 1936	50 rats	---	---	1%[1] in benzene ca. thrice weekly[2]	--do--	1 epi	---	10 mos.
Bachmann et al., 1937	10 mice	Stock	---	0.3% in sesame oil, 0.3 cc. every 2 weeks	Inj., groin	0	---	510 days
	--do--	--do--	---	--do--	--do--	0	---	266 days
Andervont and Shimkin, 1940	15 mice[3]	A	---	1 mg.[4] in sesame oil	S.C.	0[5]	---	40 weeks
Badger et al., 1940	40 mice	---	---	0.3% in benzene twice weekly[6]	Skin	11 epi., 2 pap.	---	597 days
	10 mice	---	---	5 mg. in sesame oil, repeated injections	S.C.	2 sarc.	---	583 days
	--do--	---	---	5 mg. weekly	P.O.	0	---	572 days
Cook et al., 1940a	Mice	---	---	---[6]	S.C.	0[7]	---	---
1188.--1,2,7,8-DIBENZACRIDINE METHOSULFATE[8] 								
Badger et al., 1940	10 mice	---	---	3% in saline	S.C.	2 sarc.	---	394 days
	--do--	---	---	--do--	P.O.	0	---	426 days
1189.--1,2,5,6-DIBENZCARBAZOLE 								
Bayland and Brues, 1937	20 mice	Simpson & stock	---	0.3% in benzene twice weekly	Skin	3 epi.[9], 1 pap.	---	340 days

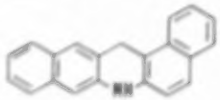
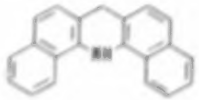
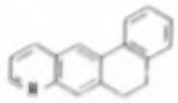
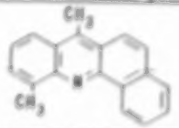
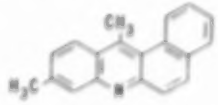
1. M.P. 216°.
2. After 185 days of treatment 7 animals were heat-cauterized at site, with the production of 3 epitheliomas.
3. Effective total.
4. M.P. 219.3-220.1° Corr. (by J.L.M.).
5. No sarcoma, but all had lung tumors.
6. Called 3,4,5,6-dibenzacridine in paper.
7. No liver lesions in 2 examined.
8. Called 3,4,5,6-dibenzacridine methosulfate in paper.
9. Liver changes noted.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1189.--1,2,5,6-DIBENZCARBAZOLE (Continued) 								
Badger et al., 1942	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	5 epi.[1], 1 pap.	9 alive at 6 mos.	287 days
	---do---	---do---	---	5 mg. in glycerol, repeated injections	S.C.	1 sarc.[2]	4 alive at 6 mos., 1 alive at 1 year	428 days
	---do---	C3H	---	---do---	S.C.	0[3]	4 alive at 6 mos., 1 alive at 1 year	415 days
1190.--1,2,7,8-DIBENZCARBAZOLE 								
Boyland and Brues, 1937	20 mice	Simpson & stock	---	0.3% in benzene twice weekly	Skin	1 epi.[4], 1 pap.	---	450 days
1191.--3,4,5,6-DIBENZCARBAZOLE 								
Boyland and Brues, 1937	60 mice	Simpson & stock	---	0.1 and 0.3% in benzene twice weekly	Skin	4 epi.[5], 4 pap.	34 died early	Ca. 240 days
	40 mice	---do---	---	0.1% in benzene twice weekly	---do---	4 epi.[6]	9 died early	Ca. 329 days
	10 rats	---	---	0.05% colloidal suspension, 2 cc. twice weekly	S.C.	8 sarc.	2 died early	196 days
Boyland and Manson, 1938	65 mice	Strck	---	0.25 mg. per 20 gm. body wt. in olive oil	I.P.	1 sarc.[7]	28 alive at 39 days	200 days
Strong et al., 1938	9 mice	CBA	M	0.5% in benzene twice weekly	Skin	4	---	Several mos.
	18 mice	---do---	M	0.1% in sesame oil; 0.2 cc., 6 injections	S.C.	14 sarc.[8]	---	204 days
	24 mice	---do---	M	0.1% in sesame oil; 0.2 cc.	S.C.	24 sarc., 5 hep.	---	145 days
	18 mice	A	M	0.1% in sesame oil; 0.2 cc., 6 injections	S.C.	17 sarc.	---	138 days
Andervont and Shimkin, 1940	10 mice	A	---	0.25 mg. in aq. susp., single injection[9]	I.V.	?[10]	---	20 weeks
	20 mice[11]	A	---	0.2 mg. in sesame oil	S.C.	17 sarc.[12]	---	40 weeks
Andervont and Edwards, 1941	93 mice	A	M & F	0.2 mg. in lard	S.C.	17 sarc.[13]	---	42 weeks

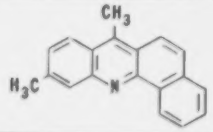
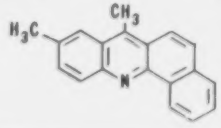
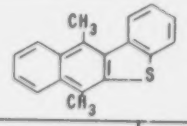
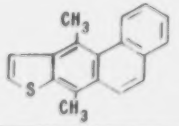
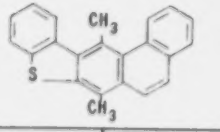
1. First within 264 days; also one cholangioma.
2. Also one epithelioma at site of injection; also 2 squamous papillomas of the stomach.
3. One lung epithelioma.
4. Liver changes noted.
5. First at about 160 days.
6. First at about 175 days.
7. At 176 days. Also cholangiomatous growths in liver.
8. Also 2 lung tumors and 5 hepatomas.
9. M.P. 156-157.5° Corr. (by J.L.H.).
10. Of the liver; first within 8 weeks.
11. Effective total.
12. 8 examined had also lung tumors.
13. Also lung tumors and hepatic changes.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1191.--3,4,5,6-DIBENZCARBAZOLE (Continued)								
Andervont and Edwards, 1941 (Continued)	135 mice	A	M & F	0.2 mg. in sesame oil	S.C.	72 sarc.[1]	---	42 weeks
	27 mice	A	F	0.2 mg. in olive oil	S.C.	20 sarc.[1]	---	--do--
	19 mice	C3H	M	0.2 mg. in lard	S.C.	5 sarc.[2]	---	--do--
	41 mice	--do--	M & F	0.2 mg. in sesame oil	S.C.	22 sarc.[2]	---	--do--
	67 mice	C	--do--	0.2 mg. in sesame oil	S.C.	66 sarc.[3]	---	--do--
Boyland et al., 1941	Rabbits	---	---	0.14% in food	P.O.	0	---	At least 74 days
Kirby and Peacock, 1946	24 mice	Stock	M & F	0.1-0.2% in acetone	Skin	5 pap.[1], 12 carc.[4]	22 alive at 150 days	550 days
	20 mice	--do--	--do--	0.2 plus 2.4 mg. in arachis oil	S.C.	12 sarc.[5]	12 alive at 100 days	280 days
1192.--1,2,5,6-DIBENZPHENAZINE 								
Barry et al., 1955	20 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	16 alive at 6 mos., 8 alive at 1 year	660 days
1193.--5,5-DIETHYLBARBITURIC ACID, Sodium Salt  **Na salt**								
Larson et al., 1946	50 mice	A	---	0.5 mg. per gm. in 0.01 ml. aq. soln. weekly for 15 weeks	I.P.	Tumors[6]	---	At least 15 weeks
Cowen, 1947	41 mice	CBA	M & F	0.2 cc. 1.5% soln. weekly for 12 weeks	I.P.	Tumors[7]	---	7-10 mos.
1194.--9,10-DIHYDRO-1,2,6,7-DIBENZACRIDINE 								
Bachmann et al., 1957	20 mice	Simpson	---	0.5% in benzene twice weekly	Skin	0	11 alive at 6 mos., 3 alive at 1 year	628 days

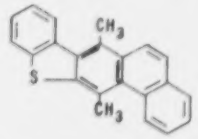
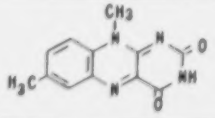
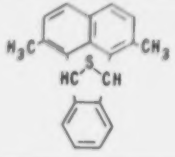
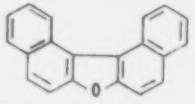
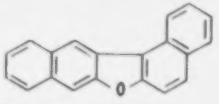
1. Also lung tumors and hepatic changes.
2. Also hepatic changes.
3. First at 105 days.
4. First at 150 days.
5. First at 115 days; no metastases. Also one hepatoma.
6. Lung tumors, not greater than in controls.
7. One, with adenomatous lumps in lungs.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1194.--9,10-DIHYDRO-1,2,6,7-DIBENZACRIDINE (Continued) 								
Bachmann, et al., 1937 (Continued)	10 mice	Stock	---	0.5% in benzene twice weekly	Skin	0	10 alive at 6 mos.; 5 alive at 457 days	457 days
Badger, et al., 1940	50 mice	Stock	---	0.5% in benzene twice weekly[1]	Skin	0	---	672 days
1195.--9,10-DIHYDRO-3,4,5,6-DIBENZACRIDINE 								
Bachmann, et al., 1937	20 mice	Simpson	---	0.5% in benzene twice weekly	Skin	0	7 alive at 1 year, 2 alive at 618 days	618 days
Badger, et al., 1940	20 mice	Stock	---	0.5% in benzene twice weekly[2]	--do--	0	---	700 days
1196.--5,6-DIHYDROBAPHTHO-(1,2-g)-QUINOLINE 								
Shear, 1941	30 mice	A	M & F	2 mg. crystals, repeated inj.	S.C.	0	---	11 mos.
Shear and Leiter, 1941g	20 mice	A	M & F	2 plus 5 mg. crystals	S.C.	0	13 alive at 9 mos.	12 mos.
1197.--5,9-DIMETHYL-3,4-BENZACRIDINE 								
Lacassagne, et al., 1938	10 mice	?	M & F	0.5% in acetone twice weekly	Skin	5 pap.,[3] 1 epi.[4]	All dead at 294 days	294 days
1198.--6,9-DIMETHYL-1,2-BENZACRIDINE 								
Lacassagne, et al., 1938	10 mice	?	M & F	0.5% in acetone twice weekly	Skin	1 pap.,[5] 1 epi.[6]	All dead at 348 days	348 days

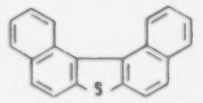
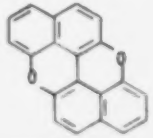
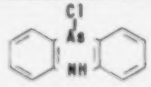
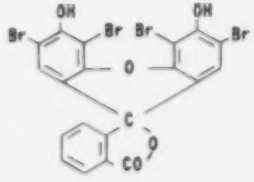
1. Called 9,10-dihydro-5,6,8,7-dibenzacridine in paper.
2. Called 9,10-dihydro-1,2,7,8-dibenzacridine in paper.
3. First at 98-149 days.
4. First at 195-221 days.
5. At 280 days.
6. At 316 days.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1199.--6,9-DIMETHYL-3,4-BENZACRIDINE 								
Lacassagne, et al., 1946	10 mice	30	M & F	0.3% in acetone twice weekly	Skin	4 pap.[1] 4 epi.[2]	All dead at 251 days	251 days
1200.--7,9-DIMETHYL-3,4-BENZACRIDINE 								
Lacassagne, et al., 1946	10 mice	30	M & F	0.3% in acetone twice weekly	Skin	4 pap.[3] 4 epi.[4]	All dead after 251 days	251 days
1201.--4,9-DIMETHYL-2,3-BENZTHIOPHANTHRENE 								
Berenblum, unpub. results[5,6]	12 mice 13 mice 12 mice --do--	Stock Stock --do-- --do--	F F M M	0.5% in benzene twice weekly 0.5% in benzene twice weekly 2 mg. in 0.2 ml. tricaprylin --do--	Skin --do-- S.C. S.C.	1 carc.[7] 4[8] 0 0	--- --- --- ---	78 weeks 70 weeks 40 weeks --do--
1202.--4,9-DIMETHYL-5,6-BENZTHIOPHANTHRENE 								
Dunlap and Warren, 1941a	Mice	---	---	---	Inj.	Tumors	---	116 days
Warren and Dunlap[9]	6 mice[10]	---	---	In tricaprylin	Inj.	6[11]	---	Over 18 weeks
1203.--4,9-DIMETHYL-2,3,5,6-DIBENZTHIOPHANTHRENE 								
Berenblum, unpub. results[5,12]	12 mice 15 mice	Inbred --do--	F M	0.5% in benzene twice weekly 2 mg. in 0.2 ml. tricaprylin	Skin S.C.	10[13] Sarc.	--- ---	21 weeks 4 mos.

1. First at 33-70 days.
2. First at 66-85 days.
3. First at 70-78 days.
4. First at 92-95 days.
5. Synthesized by Robinson and Tilak. Preliminary reports of results in 24th Ann. Rep., Brit. Emp. Cancer Camp. 126 (1947).
6. M.p. 154.5-155°.
7. Squamous-cell, in 60th week.
8. 2 papillomas and 2 squamous-cell carcinomas; first tumor at 10-1/2 weeks.
9. Unpublished results cited by Sieser and Hersberg, 1941.
10. Effective total.
11. Average time of 18 weeks.
12. M.p. 150-150.5°.
13. In 10 survivors; average latent period 9-1/2 weeks. 7 became malignant.

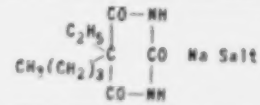
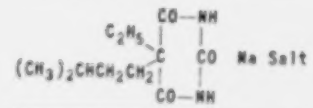
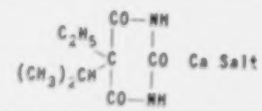
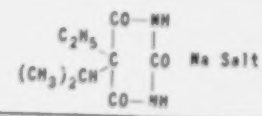
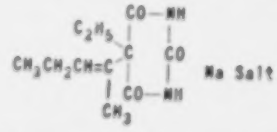
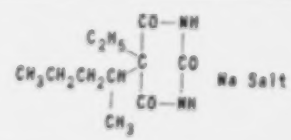
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1204.--4,9-DIMETHYL-1,2,7,8-DIBENZTHIOPHANTHRENE 								
Berenblum, unpub. results[1,2]	15 mice	Stock	F	0.3% in benzene twice weekly	Skin	7[3]	5 alive at 9 weeks	25 weeks
	12 mice	--do--	M	0.3% in benzene twice weekly	Skin	9[4]	10 alive at 11 weeks	22 weeks
	11 mice	--do--	M	1 mg. in 0.2 ml. tricaprylin	S.C.	7 sarc.[5]	---	7 mos.
1205.--6,9-DIMETHYL FLAVIN 								
Lettré and Fernholz, 1940	Mice	---	---	80 applications	Skin	0	---	Ca. 9 mos.
1206.--1,6-DIMETHYLTHIOPLEIADENE 								
Shear, 1938a	14 mice	A	F	10 mg. crystals, 3 inj.	S.C.	0	7 alive at 18 mos.	18 mos.
1207.--DINAPHTHO (2,1,1',2') FURAN[6] 								
Berenblum, unpub. results[2]	10 mice	Stock	M	1% in benzene twice weekly	Skin	0	---	53 weeks
	--do--	--do--	M	10 mg. in 0.2 ml. tricaprylin	S.C.	0	---	78 weeks
1208.-- β', β'.β,α-DINAPHTHOFURAN 								
Barry et al., 1935	10 mice	Stock	---	0.3% in benzene twice weekly	Skin	1 (?) pap.	4 alive at 6 mos., 2 alive at 1 year	486 days

1. M.P. 175°.
2. Synthesized by Robinson and Tilak. Preliminary reports of results in 24th Ann. Rep., Brit. Emp. Cancer Camp. 126 (1947).
3. 4 malignant. Average latent period 13 weeks.
4. Out of 10 surviving at 11 weeks; of these, 5 were malignant. Average latent period 14½ weeks.
5. Average latent period 4 mos.
6. Or β-dinaphthylene oxide.

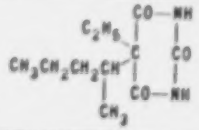
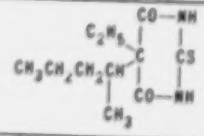
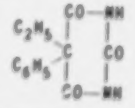
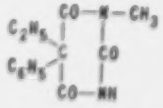
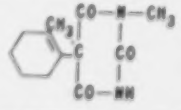
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1209.--DINAPHTHO (2,1,1',2') THIOPHENE 								
Berenblum, unpub. results[1]	11 mice 10 mice	Stock --do--	F F	0.5% in benzene twice weekly 5 mg. in 0.2 ml. tricaprylin	Skin S.C.	0 0	--- ---	22 mos. 22 mos.
1210.--DINAPHTHYLENEDICXIDE  **(Probably)**								
Kennaway, 1930	Mice	---	---	In benzene	Skin	0	---	---
1211.--DIOXANE								
Kesten et al., 1939	2 rats	---	---	1% in water for 110 days and 3% in water for 41 and 48 days resp.	P.O.	0	---	151 and 158 days resp.
1212.--DIPHENYLAMINOCHLORARSINE 								
Visser and Ten Seldam, 1938	50 mice	---	---	1/320 normal[2] in acetone twice weekly	Skin	0	---	5 mos.
1213.--DIPHENYLENE OXIDE								
Cook et al., 1932b	5 mice	Stock	---	2% in benzene twice weekly	Skin	0	4 alive at 1 year	714 days
1214.--EOSIN 								
Daels, 1923	Mice	---	---	Impregnated into thread	Through skin	0	---	150 days

1. Synthesized by Robinson and Tilak; m.p. 209-210°.

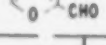
2. Impure. M.p. 175°.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1215.--5,5-ETHYL-n-BUTYL BARBITURIC ACID, SODIUM SALT 								
Larsen et al., 1946	45 mice	A	---	0.1 mg./gm. in 0.01 ml. aqueous soln. weekly for 13 weeks	I.P.	Tumors[1]	---	At least 13 weeks
1216.--5,5-ETHYL-ISOAMYLBARBITURIC ACID, SODIUM SALT 								
Larsen et al., 1946	36 mice	A	---	0.1 mg. per gm. in 0.01 ml. aqueous soln. weekly for 13 weeks	I.P.	Tumors[1]	---	At least 13 weeks
1217.--5,5-ETHYL-ISOPROPYL BARBITURIC ACID, CALCIUM SALT 								
Larsen et al., 1946	23 mice	A	---	0.1 mg./gm. in 0.01 ml. aqueous soln. weekly for 13 weeks	I.P.	Tumors[1]	---	At least 13 weeks
1218.--5,5-ETHYL-ISOPROPYL BARBITURIC ACID, SODIUM SALT 								
Larsen et al., 1946	23 mice	A	---	0.1 mg./gm. in 0.01 ml. aqueous soln. weekly for 13 weeks	I.P.	Tumors[1]	---	At least 13 weeks
1219.--5-ETHYL-5-(1-METHYL-1-BUTENYL)-BARBITURIC ACID, SODIUM SALT 								
Carmichael and Thompson, 1941	5 guinea pigs	---	---	40 mg./kg. body wt. twice weekly	I.P.	0	---	4 weeks
1220.--5,5-ETHYL-(1-METHYLBUTYL)-BARBITURIC ACID, SODIUM SALT[2] 								
Vander Brook and Cartland, 1944	20 rats	---	M & F	25 mg. per cc. water thrice weekly	P.O.[3]	0	13 alive at 28 weeks	28 weeks
	4 dogs	---	--do--	50 mg. per cc. water thrice weekly	--do--	0	1 died at 17 weeks	23 weeks

1. Of the lung, not greater than in controls.
2. See also Nembutal.
3. By stomach tube.

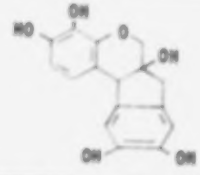
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1220.--5,5-ETHYL-(1-METHYLBUTYL)-BARBITURIC ACID, SODIUM SALT[1] (Continued)  Na Salt								
Larson et al., 1946	52 mice	A	---	0.05 mg./gm. in 0.01 ml. aqueous soln. weekly for 13 weeks	I.P.	Tumors[2]	---	At least 13 weeks
1221.--5,5-ETHYL-(1-METHYLBUTYL)-THIOBARBITURIC ACID, SODIUM SALT  Na Salt								
Larson et al., 1946	33 mice	A	---	0.1 mg./gm. in 0.01 ml. aqueous soln. weekly for 13 weeks	I.P.	Tumors[2]	---	At least 13 weeks
Orr, 1947a	60 mice	Stock	---	0.88 0.25 ml. weekly for 16 weeks	I.P.	Tumors[3]	---	Ca. 185 days
1222.--5,5-ETHYL-PHENYLBARBITURIC ACID, SODIUM SALT  Na Salt								
Boughton and Stoland, 1943	7 rats	Wistar	---	In food	P.O.	0	2 dead at 82 weeks	82 weeks
Larson et al., 1946	51 mice	A	---	0.1 mg./gm. in 0.01 ml. aqueous soln. weekly for 13 weeks	I.P.	Tumors[2]	---	At least 13 weeks
1223.--3-METHYL-5,5-ETHYLPHENYLBARBITURIC ACID, SODIUM SALT  Na Salt								
Larson et al., 1946	43 mice	A	---	0.1 mg./gm. in 0.01 ml. aqueous soln. weekly for 13 weeks	I.P.	Tumors[4]	---	At least 13 weeks
1224.--3-METHYL-5,5-METHYLCYCLOHEXENYLBARBITURIC ACID, SODIUM SALT  Na Salt								
Larson et al., 1946	47 mice	A	---	0.1 mg./gm. in 0.01 ml. aqueous soln. weekly for 13 weeks	I.P.	Tumors[2]	---	At least 13 weeks
1225.--FRUCTOSE $C_6H_{12}O_6$								
Toxizawa, 1938	Mice	---	---	25% aqueous soln.	S.C.	1 sarc.	---	---
Toxizawa, 1939	--do--	---	---	Concentrated aqueous soln., repeated inj.	S.C.	2 sarc.	9 alive at 296 days	Over 296 days

1. See also Nembutal.
2. Of the lung, not greater than in controls.
3. Subpleural nodules, possibly adenoma, in 2 mice.
4. See also Luminal.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1225.--FRUCTOSE (Continued) $C_6H_{12}O_6$								
Takizawa, 1943a	Mice	---	---	25% aq. soln. 0.75 cc. daily or every 2 days	S.C.	2 sarc.	16 alive at 250 days	At least 485 days
1226.--FURFURAL 								
Nakahara and Mori, 1939	100 rats	Albino	---	4 to 10% in food	P.O.	0[1]	62 died in 37 days	167 days
	Rats	--do--	---	1 to 8% in food	--do--	--do--	---	At least 500 days
	Guinea pigs	---	---	In food	--do--	--do--	---	---
	Rabbits	---	---	--do--	--do--	--do--	---	---
Nakahara and Mori, 1940	514 rats	---	---	2-5% in food	P.O.	0[2]	---	199 days
	Rats	---	---	Small dosage in food	P.O.	0[3]	---	At least 500 days
Nakahara and Mori, 1941a	513 rats	---	M & F	1-5% in food[4]	P.O.	0[5]	---	548 days
1227.--GALACTOSE $C_6H_{12}O_6$								
Takizawa, 1938	Mice	---	---	25% aqueous soln.	S.C.	0[6]	---	---
Takizawa, 1939a	Mice	---	---	25% aqueous soln. 0.75 cc. every day or two	S.C.	4 sarc.[7]	8 alive at 390 days	Over 390 days
Takizawa, 1939b	8 mice	---	---	0.75 cc. of 25 gr. in 100 cc. distilled water every other day	S.C.	4 sarc.[8]	---	Ca. 390 days
Takizawa, 1940a	Mice	---	---	25% aq. soln. 0.75 cc. daily or every other day	S.C.	4 sarc.	13 alive at 250 days	At least 504 days
1228.--GLUCOSE $C_6H_{12}O_6$								
Nishiyama, 1935a	22 rats	White	---	25% aqueous soln 4 cc. per 100 gm. body weight daily[9]	S.C.	5 sarc.	15 died reg. in 200 days	284 days
Nishiyama, 1936	16 rats	---	---	--do--	S.C.	2 sarc.[10]	8 died reg. in 5 mos.	At least 11 mos.
Nishiyama, 1937	69 rats	---	---	--do--	Inj.	11 sarc.[11]	47 alive at 100 days	At least 100 days
	Rats	---	---	50% aqueous soln. 2 cc. per 100 gm. body weight, irregular inj.	Inj.	3 sarc.	7 alive at 100 days	--do--

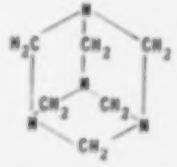
1. Liver cirrhosis in majority of rats and a few in guinea pigs.
2. Liver cirrhosis in 74 animals, usually at 100-120 days, but earliest case before 40 days.
3. Required 400-500 days for cirrhosis to develop.
4. See also Nakahara and Mori, 1941b.
5. Cirrhosis of the liver produced.
6. Subcutaneous fibrosis or nodular formations noted.
7. Earlier changes described.
8. Spindle-cell and polymorphous.
9. Animals also fed o-aminoazotoluene.
10. In 55 other rats, fed simultaneously with o-aminoazotoluene, 6 sarcomas were obtained.
11. Other animals fed and injected with o-aminoazotoluene developed a higher incidence of tumors.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1228.--GLUCOSE (Continued) $C_6H_{12}O_6$								
Nishiyama, 1938	69 rats	---	---	25% aqueous soln. 1 to 4 cc. per 100 gm. body weight daily	S.C.	11 sarc.[1,2]	41 alive at 100 days	320 days
	29 rats	---	---	50% aqueous soln. 1 to 4 cc. per 100 gm. body weight daily	S.C.	3 sarc.[1,2]	7 alive at 100 days	374 days
Nonaka, 1938	70 rats	Anite	---	25% aqueous soln. 2 to 4 cc. per 100 gm. body weight daily	S.C.	3 sarc.[3]	42 died neg. in 6 mos.	540 days
Tsuzuki, 1938	Rats	Anite	---	Concentrated aqueous soln.	S.C.	2 sarc.[3]	10 alive at 250 days	At least 250 days
	Mice	---	---	25% aqueous soln.	S.C.	6 sarc.[3]	18 alive at 250 days	---do---
Tsuzuki, 1940a	Mice	---	---	25% aq. soln. 0.75 cc. daily or every 2 days	S.C.	6 sarc.	18 alive at 250 days	At least 365 days
Zarattini, 1940	35 rats	Albino	---	50% aq. soln. 2-3 cc. daily for 120 days	S.C.	0	---	4 mos.
Ellis and Krantz, Jr., 1941	20 rats	---	M	40% in food	P.O.	0	---	3 mos.
Roussay et al., 1947	26 rats[7]	---	---	30 gr./kg. thrice daily, 6 hours apart	I.P.	0		
	7 rats[7]	---	---	20% in saline, 10 g./kg. daily for one week, 20 g./kg. daily for next week, and 30 g./kg. in third week	I.P.	0	-	1 mo. ---do---



1229.--HEMATOXYLIN

Deels, 1923	Mice	---	---	Impregnated into thread	Skin	0	---	150 days

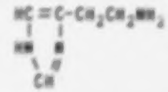


1230.--HEXAMETHYLENETETRAMINE

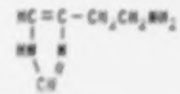
Shear and Stewart, 1941	6 mice	D	M	Ca. 5 mg. crystals, repeated inj.	S.C.	0	All dead in 5.5 mos.	5.5 mos.
	14 mice	Stock	M	---do---	S.C.	0	---do---	---do---

1. Feeding other rats also o-aminoazotoluene increased the incidence of sarcomas.
2. First tumor in 5 months; metastases to lymph nodes and lungs.
3. First tumor in 185 days; metastases to lymph nodes and lungs.
4. First tumor in 405 days; transplantation successful in 2 cases.
5. In other animals fed also o-aminoazotoluene, tumors were produced sooner and in more animals.
6. Metastases to epidermis, peritoneal cavity, diaphragm, pleural cavity, lungs, and mediastinum.
7. Partially pancreatectomized.

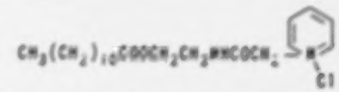
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment

1231.--HISTAMINE 

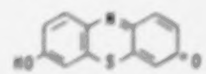
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Weinstein, 1936	Rabbits and cats	---	---	---	---	0	---	Rather long treatment

1232.--HISTAMINE DIHYDROCHLORIDE  .2HCl

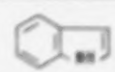
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
May et al., 1942	1 wildebeeste	---	---	20 mg. (calc. as base) in beeswax-mineral oil daily	I.M.	0	---	53 days
	2 calves	---	---	50-150 mg. (calc. as base) in beeswax-mineral oil daily	I.M.	0	---	50 days
	1 monkey	---	---	40 mg. (calc. as base) in beeswax-mineral oil daily	I.M.	0	---	59 days
	3 rabbits	---	---	30 mg. (calc. as base) in beeswax-mineral oil daily	I.M.	0	---	41 days

1233.--1-(2-HYDROXYETHYLCARBAMYLMETHYL)-PYRIDINIUM CHLORIDE, LAURIC ESTER[1] 

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Klein and Kuppers, 1944	20 rats	Sprague-Dawley	M & F	0.15 aq. soln.	P.O.	0	---	25 weeks
	20 rats	F_1 and F_2 of above[2]	--do--	--do--	P.O.	0	---	4-12 weeks

1234.--HYDROXYPHENTHIAZONE 

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
McNaught et al., 1939	4 rats	Wistar	---	0.15 g. (avg.) daily in food	P.O.	0	---	6 weeks

1235.--INDOLE 

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
Stoeber and Wacker, 1911	Rabbits	---	---	5% in rabbit fat, repeated inj.	S.C., ear	0[2]	---	---
Bentzin, 1911	Rabbits	---	---	In olive oil or rabbit fat	I.M., ear	0	---	At least 8 weeks
Carrel, 1926	6 fowls	---	---	1:1,000 to 1:25,000 in water[3]	I.M., breast	4	---	5 mos.
Fantinatti, 1927	6 fowls	---	---	1:1,000 to 1:200,000 in water[3]	--do--	0	---	Long period
	[illegible] fowls	---	---	1:1,000 to 1:200,000 in water[4]	--do--	0	---	--do--

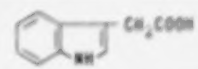
1. Called cetylaminoformylmethylpyridinium chloride (Emulsept).
2. Atypical proliferation observed, resembling cancer.
3. With embryonic pulp.
4. With inflammatory tissue.

Reference	Animal	Strain or Type	Sex	Preparation and Dose	Site and Route	Animals with Tumors	Survival	Duration of Experiment

1235.--INDOLE (Continued)

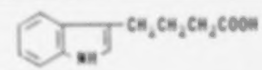
Reference	Animal	Strain or Type	Sex	Preparation and Dose	Site and Route	Animals with Tumors	Survival	Duration of Experiment
Rappaport, 1926	60 rats	White	---	1:1,000 to 1:4,000 in water[1]	I.M., S.C., intra-abdominal, intratesticular	0	---	Up to 2 mos.
Lazzari, 1927	Rats Fowls	White ---	--- ---	1:5,000 in water[1] --Do--	--- ---	[illegible] 2[2]	--- ---	--- ---
Petroff and Krotkina, 1928	25 rats	---	---	0.1% aqueous soln., 1 cc. weekly; then 0.13 mg. daily,[3]	S.C.	8[3]	---	8 to 13 mos.
Büngeler, 1932	104 mice	---	---	Repeated application	----	4[4]	57 alive at 8 mos.	12 mos.
Büngeler, 1933	11 mice 2 mice 104 mice	White --Do-- --Do--	--- --- ---	1% aqueous soln., 0.1-0.2 cc., repeated inj. --Do-- ---	S.C. S.C. Parenteral inj.	0 0 4[5]	--- --- 126 alive at 6 mos.	2 to 25 mos. 25 to 30 mos. 12 mos.
Bernard, 1936	20 rats	White	---	1 mg. in propylene oil every 3 days	Intramedullary	2[6]	1 died early	7 mos.
Shear and Leiter, 1941b; Shear and Stewart, 1941	12 mice 12 mice	Mixed M	F ---	1% in lard, 0.25 cc., repeated inj.	S.C.	0	10 alive at 1 year, 9 alive at 18 mos.	25 mos.

1236.--INDOLE-3-ACETIC ACID



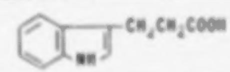
Reference	Animal	Strain or Type	Sex	Preparation and Dose	Site and Route	Animals with Tumors	Survival	Duration of Experiment
Shear and Leiter, 1941b	20 mice	dba	F	10 mg. crystals, repeated inj.	S.C.	0	14 alive at 1 year, 7 alive at 18 mos.	19 mos.

1237.--γ-(INDOLE-3)-n-BUTYRIC ACID



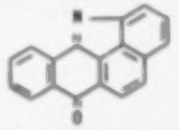
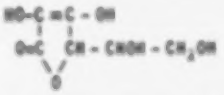
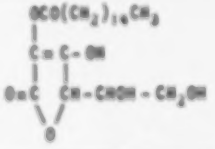
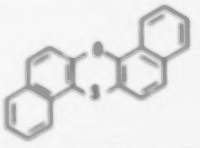
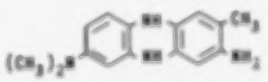
Reference	Animal	Strain or Type	Sex	Preparation and Dose	Site and Route	Animals with Tumors	Survival	Duration of Experiment
Shear and Leiter, 1941b	20 mice	dba	F	10 mg. crystals, repeated inj.	S.C.	0	10 alive at 1 year, 4 alive at 16 mos.	16 mos.

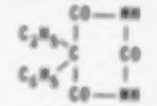
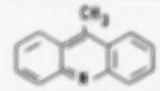
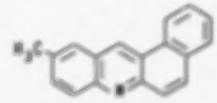
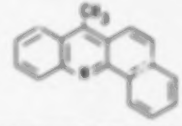
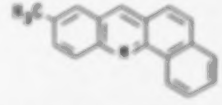
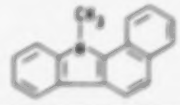
1238.--β-(INDOLE-3)-PROPIONIC ACID



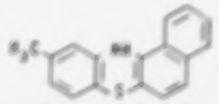
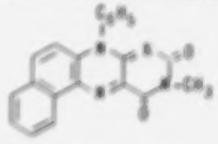
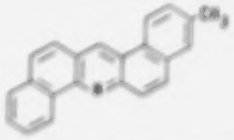
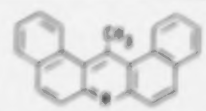
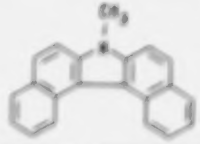
Reference	Animal	Strain or Type	Sex	Preparation and Dose	Site and Route	Animals with Tumors	Survival	Duration of Experiment
Shear and Leiter, 1941b	20 mice	A	M	10 mg. crystals, repeated inj.	S.C.	0	19 alive at 10 mos., 4 alive at 18 mos.	19 mos.

1. With embryonic pulp.
2. Teratoid; all benign.
3. At site of embryonic pulp injection.
4. One lymphosarcoma-like; 3 cases of lymphadenosis; leukemia.
5. Tumor-like lymphadenosis of the liver. Changes in blood and other organs noted.
6. Blood changes noted.

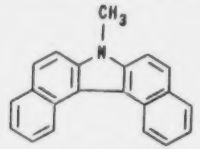
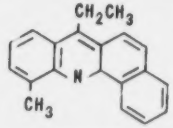
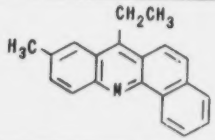
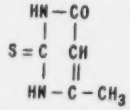
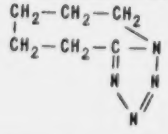
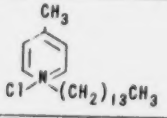
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1239.--2,9(N)-INDOLOANTHRONE 								
Joseph, 1939	10 mice 20 mice	--- ---	--- ---	2% in benzene twice weekly 0.02 gm. in paraffin	Skin S.C.	0 0	--- ---	5 mos. ---do---
1240.--d-ISOASCORBIC ACID 								
Fitzhugh and Nelson, 1946b	20 rats ---do---	Osborne-Mendel ---do---	M M	2% and 5% in food 0.05-0.2% in food	P.O. ---do---	0 0	2 died early ---	31 weeks 2 years
1241.--d-ISOASCORBYL PALMITATE 								
Fitzhugh and Nelson, 1946b	20 rats 20 rats	Osborne-Mendel ---do---	M M	2% and 5% in food 0.05% to 0.25% in food	P.O. P.O.	0 0	2 died early ---	36 weeks 2 years
1242.--ISO-ALPHANAPHTHOFLAVIN 								
Berry et al., 1935 Bachmann et al., 1937	10 mice ---do---	Stock ---do---	--- ---	0.3% in benzene twice weekly ---do---	Skin ---do---	0 0	9 alive at 6 mos. 9 alive at 6 mos., 3 alive at 1 year	295 days 438 days
1243.--LACTOSE $C_{12}H_{22}O_{11}$								
Tsuzuki, 1938	Mice	---	---	10% aqueous soln.	S.C.	0	---	---
1244.--LEUCO NEUTRAL RED 								
Shear, 1941	10 mice	A	M	5 mg. crystals, repeated inj.	S.C.	0	---	14 mos.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1245.--LUMINAL[1] 								
Haddow et al., 1937	11 rats	Lister	M & F	7.5 mg. in saline thrice	I.P.	0	---	37 days
1246.--MANNOSE $C_6H_{12}O_6$								
Tsuzuki, 1919	Mice	---	---	Concentrated aqueous soln., repeated inj.	Inj.	0	---	200 days
1247.--9-METHYLACRIDINE 								
Lacassagne et al., 1947	---	---	---	---	---	0	---	---
1248.--7-METHYL-1,2-BENZACRIDINE 								
Bachmann et al., 1937	20 mice	Unspecified	---	0.3% in benzene twice weekly	Skin	0	18 alive at 6 mos., 8 alive at 1 year	375 days
1249.--9-METHYL-3,4-BENZACRIDINE 								
Lacassagne et al., 1941	10 mice	CF	M & F	0.5% in acetone twice weekly	Skin	0	All died in 451 days	451 days
1250.--7-METHYL-3,4-BENZACRIDINE 								
Lacassagne et al., 1941	10 mice	CF	M & F	0.5% in acetone twice weekly	Skin	0	All died in 451 days	451 days
1251.--9-METHYL-1,2-BENZOCARBAZOLE 								
Lacassagne et al., 1947	10 mice	Swiss	---	1%, 1 drop twice weekly in acetone	Skin	Cancer and papilloma	---	6 mos.

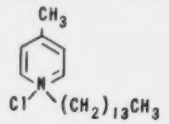
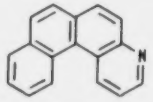
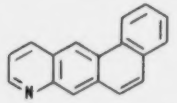
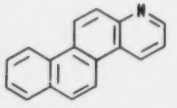
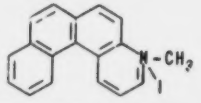
1. See also 5,5-Ethyl-phenylbarbituric acid, Sodium Salt.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1252.--2-METHYL-7,9-BENZOPHENOTHIAZINE 								
Lacassagne et al., 1947	---	---	---	---	---	0	---	---
1253.--3-METHYL-5,6-BENZO-9-PHENYL-FLAVIN 								
Lettré and Fernholz, 1940	Mice	---	---	In aq. suspension or in soln. in tributyrin or olive oil	S.C.	0	---	10 weeks
1254.--METHYLCELLULOSE[1]								
Hueper, 1942b	5 rabbits	---	---	28 soln., 25 cc. twice weekly	I.V.	0	2 died by 9 days	90 days
	7 dogs	---	---	28 aq. soln., 25-120 cc. 2-5 times weekly	I.V.	0	5 died by 57 days	4 mos.
1255.--3'-METHYL-1,2,5,6-DIBENZACRIDINE 								
Lacassagne et al., 1947	---	---	---	---	---	0	---	---
1256.--9-METHYL-1,2,7,8-DIBENZACRIDINE 								
Lacassagne et al., 1946	10 mice	Alli	W & F	0.38 in acetone twice weekly	Skin	5 pap., 2 epi.[2]	5 alive after 202 days	At least 202 days
1257.--N-METHYL-3,4,5,6-DIBENZCARBAZOLE 								
Kirby and Peacock, 1946	16 mice	Shock	W & F	0.1-0.28 in acetone	Skin	4 carc.[3]	14 alive at 100 days	480 days

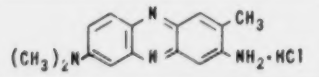
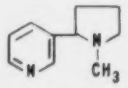
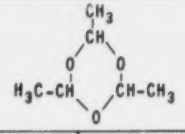
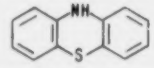
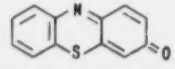
1. Highly viscous variety (400 centipoises).
2. First papilloma at 137-141 days; first epithelioma at 155 days.
3. First at 254 days; also one sarcoma in one of the 4 carcinoma animals. First papilloma at 225 days; no hepatomas.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1257.--N-METHYL-3,4,5,6-DIBENZCARBAZOLE (Continued) 								
Kirby and Peacock, 1946 (Continued)	24 mice	Stock	M & F	0.2 plus 0.4 mg. in arachis oil	S.C.	2 sarc.[1]	15 alive at 100 days	500 days
1258.--5-METHYL-9-ETHYL-3,4-BENZACRIDINE 								
Lacassagne et al., 1946	10 mice	RIII	M & F	0.3% in acetone twice weekly	Skin	1 pap.[2]	All dead at 253 days	At least 253 days
1259.--7-METHYL-9-ETHYL-3,4-BENZACRIDINE 								
Lacassagne et al., 1946	10 mice	17	M & F	0.3% in acetone twice weekly	Skin	3 pap.[3], 2 epi.	All died in 268 days	At least 268 days
1260.--4-METHYL-2-THIOURACIL 								
Chapman, 1944	6 rats	Albino	M	81 or 147 mg./kg. body wt. in 8% gum-saline susp. daily	P.O.	0	---	30 days
1261.--METRAZOLE 								
Laubender and Barth, 1941	7 rabbits	---	---	12-18 mg./kg. 5% soln.	I.V.	0	---	9 weeks
1262.--MYRISTYL-γ-PICOLINIUM CHLORIDE 								
Nelson and Lyster, 1946	49 rats	Sprague-Dawley	M	100-800 mg./kg.	S.C.	0	---	At least 60 days

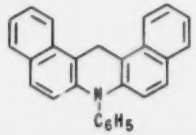
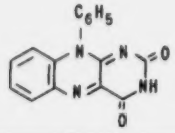
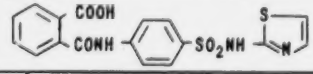
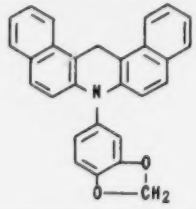
1. First at 215 days; no hepatomas.
2. First at 137 days.
3. First papilloma at 172 days; first epithelioma at 204 days.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1262.--MYRISTYL-γ-PICOLINIUM CHLORIDE (Continued) 								
Nelson and Lyster, 1946 (Continued)	100 rats	Sprague-Dawley	M	2.5-100 mg./kg. daily	I.P.	0	---	At least 60 days
	50 rats	--do--	M	15-30 mg./kg.	I.T.	0	---	--do--
	61 rats	--do--	M	100-800 mg./kg.	P.O.[1]	0	---	--do--
1263.--NAPHTHO-(1,2-f)-QUINOLINE 								
Joseph, 1939	100 mice	---	---	2% in benzene twice weekly for 5 mos.	Skin	0	---	7 mos.
Shear, 1941	20 mice	A	M & F	2 mg. crystals, repeated injections	S.C.	0	---	11 mos.
Shear and Leiter, 1941b	20 mice	A	M & F	2 plus 5 mg. crystals	S.C.	0	12 alive at 7 mos., 3 alive at 12 mos.	12 mos.
1264.--NAPHTHO-(1,2-g)-QUINOLINE 								
Shear, 1941	20 mice	A	M & F	2 mg. crystals, repeated injections	S.C.	0	---	9 mos.
Shear and Leiter, 1941b	20 mice	A	M & F	2 plus 5 mg. crystals	S.C.	0	High mortality due to infection	10 mos.
1265.--NAPHTHO-(2,1-f)-QUINOLINE 								
Shear, 1941	20 mice	A	M & F	2 mg. crystals, repeated injections	S.C.	0	---	11 mos.
Shear and Leiter, 1941b	20 mice	A	M & F	2 plus 5 mg. crystals	S.C.	0	7 alive at 12 mos.	12 mos.
1266.--NAPHTHO-(1,2-f)-QUINOLINE METHIODIDE 								
Joseph, 1939	100 mice	---	---	2% in benzene twice weekly for 5 mos.	Skin	0	---	7 mos.
	20 mice	---	---	0.02 gm. in paraffin	S.C.	0	---	--do--

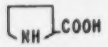
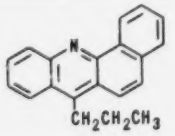
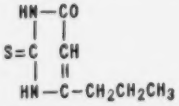
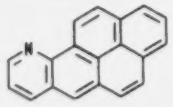
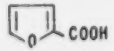
1. By stomach tube.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1267.--NEMBUTAL[1]								
Orr, 1947a	60 mice	Stock	---	Equivalent to 0.64% in 0.25 ml. weekly for 18 weeks	I.P.	Tumors[2]	---	Ca. 185 days
1268.--NEUTRAL RED 								
Shear and Stewart, 1941	22 mice	Stock	---	Ca. 5 mg. suspended in lard, repeated injections	S.C.	0	---	19 mos.
1269.--NICOTINE 								
Haga, 1913	1 rabbit	---	---	0.3 to 0.5% aqueous soln. every 2 days, 4 injections	S.C., ear	0	---	24 days
Yun and Kim, 1938	Guinea pigs	---	F	0.3 mg. 5 injections over 190 days	S.C.	0	---	At least 190 days
Hueper, 1943	6 dogs	Mongrel	---	0.7-22.2 mg. in water, then 30-75 mg. in peanut oil, 5 times weekly	S.C.	0	4 died in 1 mo.	10 mos.
	60 rats	---	M & F	0.2-10.0 mg. in water 5 times weekly[3]	S.C.	0	---	8 mos.
1270.--PARALDEHYDE 								
Larsen and Heston, 1945	Mice	A & C	M & F	---	I.P.	0	---	6 mos.
1271.--PHENOTHIAZINE 								
McNaught et al., 1939	4 rats	Wistar	---	0.14 g. (avg.) daily in food	P.O.	0	---	6 weeks
Nicholson and McCulloch, 1942	12 fowls	White leghorn & R.I. Red	F	0.5 or 1.0 g. daily by capsule	P.O.	0	2 died in 85 days	85 days
	48 fowls	White leghorn	F	0.22% in food for 2 mos.[4]	P.O.	0	All lived	4 mos.
1272.--PHENOTHIAZONE 								
Greer, 1943	Mice	---	---	In food	P.O.	0	---	11 mos.

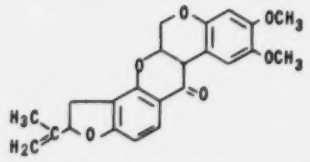
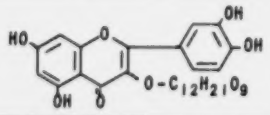
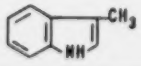
1. See also 5,5-Ethyl-(1-methylbutyl)-barbituric acid, sodium salt.
2. Subpleural nodules, possible adenoma, in 2 mice.
3. 120 other rats given nicotine and other substances.
4. Calc. ca. 0.1 g. daily.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1273.--10-PHENYL-9,10-DIHYDRO-1,2,7,8-DIBENZACRIDINE 								
Bachmann et al., 1937	10 mice	Simpson	---	0.3% in benzene twice weekly	Skin	0	4 alive at 6 mos., 1 alive at 1 year	440 days
	10 mice	Stock	---	--do--	--do--	0	1 alive at 6 mos., 1 alive at 1 year	393 days
	--do--	--do--	---	--do--	--do--	0	5 alive at 1 year, 3 alive at 520 days	520 days
Badger, 1940	30 mice	Stock	---	0.3% in benzene twice weekly	Skin	0	---	804 days
1274.--9-PHENYLFLAVIN 								
Lettré and Fernholz, 1940	Mice	---	---	80 times	Skin	0	---	Ca. 9 mos.
1275.--PHTHALYLSULFATHIAZOLE 								
Mattis et al., 1944	30 rats	Wistar	---	2-10% in food	P.O.	0	5 died	31 days
	6 monkeys	Macaca mulatta	F	0.5-5.0 g./kg. body wt. daily as suspension in 0.5% gum tragacanth	P.O.[1]	0	---	--do--
Miller, 1945	6 rats	Piebald	---	0.5% in food	P.O.	0	All alive	119-132 days
1276.--10-PIPERONYL-9,10-DIHYDRO-1,2,7,8-DIBENZACRIDINE 								
Bachmann et al., 1937	20 mice	Simpson	---	0.3% in benzene twice weekly	Skin	0	8 alive at 6 mos., 7 alive at 1 year	635 days
	10 mice	Stock	---	--do--	--do--	0	7 alive at 6 mos., 1 alive at 1 year	444 days

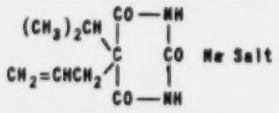
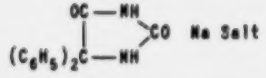
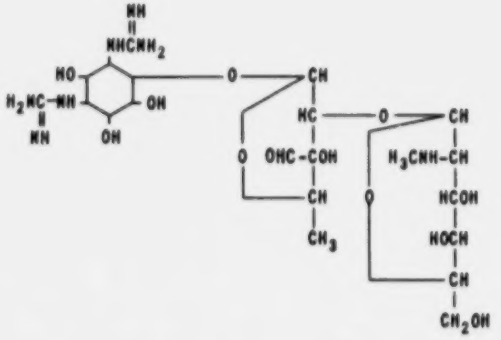
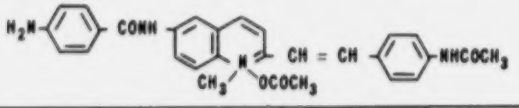
1. By stomach tube.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1277.--l-PROLINE 								
Hammett, 1940	78 mice	---	F	0.008 M. in water, 0.2 cc. daily	S.C.	Tumors[1]	---	Death
1278.--9-n-PROPYL-3,4-BENZACRIDINE 								
Lacassagne et al., 1947	---	---	---	---	---	0	---	---
1279.--6-n-PROPYL-2-THIOURACIL 								
Mayer, 1947	6 dogs[2]	Beagle	M & F	30 mg./kg. daily in water	P.O.	0	---	At least 8 mos.
	--do--	--do--	--do--	30 mg./kg. daily by capsule	P.O.	0	---	--do--
1280.--PYRIDINE								
Stoeber and Wacker, 1910	Rabbits	---	---	2 plus 5% in olive oil, repeated injections	S.C., ear	0[3]	---	---
1281.--3(N),4-PYRIDINOPYRENE 								
Badger et al., 1940	20 mice	---	---	0.3% in benzene twice weekly	Skin	0	1 alive at 748 days	748 days
	Mice	---	---	---	S.C.	0	1 alive at 182 days	182 days
Shear, 1941	20 mice	A	M & F	2 mg. crystals, repeated injections	S.C.	0	---	8 mos.
Shear and Leiter, 1941b	20 mice	A	M & F	2 plus 5 mg. crystals	S.C.	0	---	9 mos.
1282.--PYROMUCIC ACID 								
Nakahara and Mori, 1941a	Rats	---	---	In food	P.O.	0	---	154 days

1. Mammary carcinoma in higher percentage of animals than with controls.
2. Pups.
3. Epithelial proliferation observed.

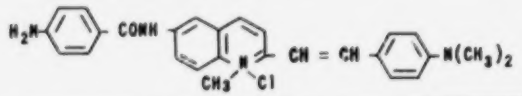
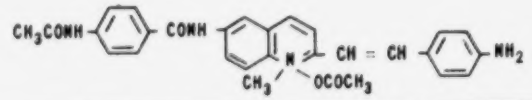
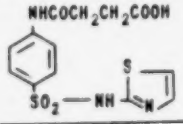
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1283.--PYRROLE								
Bierich, 1922	Mice	---	---	---	Skin	1	---	---
1284.--ROTENONE 								
Lightbody and Mathews, 1936	28 rats	---	---	5-15 mg./kg. body wt. daily	P.O.	0	High mortality	37 days
Ambrose et al., 1943	10 rats	Albino	M	0.008% in food	P.O.	0	---	At least 140 days
1285.--RUTIN 								
Wilson et al., 1947c	16 rats	---	---	10 mg. in 5% alcohol	I.P.	0	---	At least 140 days
	8 guinea pigs	---	---	--do--	I.P. or I.V.	0	---	--do--
	12 rabbits	---	---	20% in propylene glycol, 100-200 mg./kg.	I.V.	0	---	At least 150 days
	12 rats	Albino	M & F	1% in food	P.O.	0	---	400 days
	--do--	--do--	--do--	0.5% - 0.25% in food	P.O.	0	---	150 days
1286.--SKATOLE 								
Stoeber and Wacker, 1910	Rabbits	---	---	5% in rabbit fat, repeated injections	S.C., ear	0[1]	---	---
Benthin, 1911	Rabbits	---	---	In olive oil or rabbit fat	I.M., ear	0	---	At least 8 weeks
Pentimalli, 1926	Fowls	---	---	1:1000 to 1:200,000 in water[2]	I.M., breast	0	---	Long period
	--do--	---	---	1:1000 to 1:200,000 in water[3]	--do--	0	---	--do--
Shear and Leiter, 1941b	8 mice	dba	F1	5% in lard, 0.25 cc. repeated injections	S.C.	0	15 alive at 1 year, 10 alive at 18 mos.	26 mos.
	20 mice	Stock	F1					
Shear and Stewart, 1941	20 mice	Stock	F	5% in lard, 0.25 cc., repeated injections	S.C.	0	---	25 mos.

1. Atypical proliferation observed, resembling cancer.
2. With embryonic pulp.
3. With inflammatory tissue.

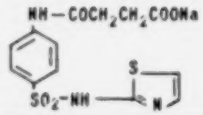
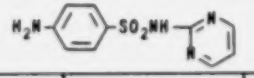
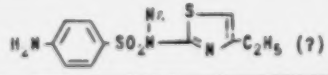
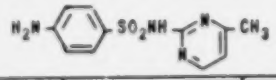
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1287.--SODIUM ALURATE 								
Boughton and Stoland, 1943	9 rats	Wistar	---	In food	P.O.	0	3 dead at 74 weeks	74 weeks
1288.--SODIUM DIPHENYL HYDANTOINATE 								
Emmett et al., 1943	11 guinea pigs	---	---	50-100 mg./kg. daily	P.O.	---	---	Ca. 7 weeks
1289.--STREPTOMYCIN 								
Smith and McClosky, 1945	29 guinea pigs[1]	---	M	5000 units daily	I.M.	0	---	32-110 days
1290.--STYRYL 245 								
Browning et al., 1933	15 mice	---	---	---	---	0	---	14 mos.
Browning et al., 1936	18 mice	Stock	---	1:200 to 1:250 in water	S.C.	0	---	19 mos.
McCluskie and Niven, 1938	5 mice	---	F	1% aqueous soln. 1 cc. per 20 gm. body wt.[2]	Inj.	0	---	1 year

1. Tuberculous animals.

2. Tends to be deposited at site, recognizable for several months.

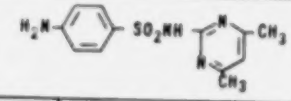
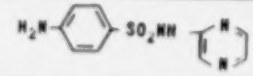
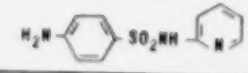
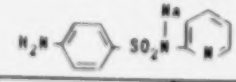
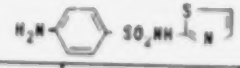
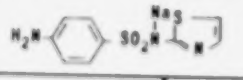
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1291.--STYRYL 427 								
McCluskie and Niven, 1938	3 mice	---	F	1:1500 in water; 1 cc. per 20 gm. body wt.[1]	Inj.	0	---	14 mos.
1292.--STYRYL 430 								
Browning et al., 1936	Mice	---	M & F	Aqueous soln.	S.C.	10 sarc.[2]	19 alive at 8 mos., 4 alive at 19 mos.	19 mos.
McCluskie and Niven, 1938	14 mice	---	F	1:150 in water 1 cc. per 20 gm. body wt.[3]	Inj.	5 sarc.	7 alive at 9 mos.	1 year
Bell, 1938b	Rats	---	---	In aq. soln.	Brain	0[4]	---	Ca. 4 mos.
Bell, 1938a	5 rats	White stock	M & F	1% suspension in saline	Brain	3	---	180 days
Bell and Hetherington, 1943	1 rat	—do—	M	0.1 cc. of 1% soln.	Inj.	1[5]	---	293 days
1293.--2-(N^4-SUCCINYL-SULFANILAMIDO)-THIAZOLE 								
Poth and Knotts, 1941	Dogs	---	---	1 g. per kg. body wt. daily	P.O.	0	---	5 weeks
Daft et al., 1942b	10 rats	---	---	In food	P.O.	0	---	2 mos.
Spicer et al., 1942	Rats	---	---	1% in food	P.O.	0	---	Up to 106 days
Welch et al., 1942	10 rats	Sunny Hill	---	5% in food	P.O.	0	---	33 days
Kornberg et al., 1944	8 rats	Wistar	---	1% in food	P.O.	0	---	Ca. 10 weeks
Miller, 1945	6 rats	Piebald	---	0.5%-2% in food	P.O.	0	All lived	Ca. 119-132 days

1. Tends to be deposited at site.
2. Tumors developed between 8 and 19 mos.
3. Tends to be deposited at site, recognizable for several months.
4. And tumor-like proliferation of glia and ependyma.
5. Adenomata of the anterior lobe and gliomata of the brain.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1294.--2-(N^4-SUCCINYL-SULFANILAMIDO)-THIAZOLE, SODIUM SALT 								
Aelch et al., 1942	9 monkeys	Macaca mulatta	---	0.5-5 g. per kg. body wt. in aq. soln. daily	P.O.[1]	0	---	30 days
1295.--SUCROSE $C_{12}H_{22}O_{11}$								
Nonaka, 1938	Rats	White	---	35% aq. soln. 2 cc. per 100 gm. body wt. daily	S.C.	0	---	285 days
Takizawa, 1938	Mice	---	---	25% aqueous soln.	S.C.	0[2]	---	---
Takizawa, 1939	--do--	---	---	Concentrated aqueous soln., repeated inj.	Inj.	0	---	200 days
Suntzeff, 1940	9 mice	A, D, C57, and AKA	M	Saturated soln. in water 6 times weekly	S.C.	0	---	1 mo.
Zarattini, 1940	20 rats	Albino	---	50% aq. soln. 2-3 cc. daily for 120 days	S.C.	0	---	6 mos.
1296.--SULFADIAZINE 								
Kornberg et al., 1944	21 rats	Wistar or Osborne-Mendel	---	1% in food	P.O.	0	---	At least 10 weeks
Schmidt et al., 1944	5 monkeys	Rhesus	---	0.3-4.8 gr./kg. daily	P.O.[1]	0	---	30 days
	3 monkeys	--do--	---	0.6-5 gm./kg. daily	P.O.[1]	0	---	50 days
Kornberg et al., 1945	10 rats	---	---	1% in food	P.O.	0	---	30 days
	18 rats	---	---	2-4% in food	--do--	0	---	--do--
	15 rats	---	---	4% in food	--do--	0	---	--do--
Harris and Kohn, 1947	10 rats	Vanderbilt	M	0.8-0.25% a food	P.O.	0	---	44-77 days
1297.--SULFAETHYLTHIAZOL, SODIUM SALT 								
Chiancone, 1941	Mice	White	---	0.86 gr./kg. twice daily	I.P.	0	---	28 days
	Rats	--do--	---	0.56 gr./kg. twice daily	I.P.	0	---	42 days
1298.--SULFAMERAZINE 								
Endicott et al., 1944	18 rats	Wistar and Osborne-Mendel	---	1% in food	P.O.	0	---	At least 30 days
Schmidt et al., 1944	6 monkeys	Rhesus	---	0.15-1.2 gr./kg. daily	P.O.[1]	0	---	30 days

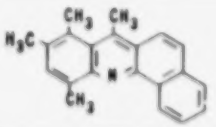
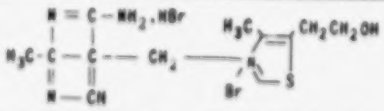
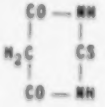
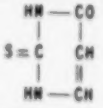
1. By stomach tube.

2. A slightly fibrous growth noted.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1299.--SULFAMETHAZINE 								
Schmidt et al., 1944	7 monkeys	Rhesus	---	0.15-2.4 gr./kg. daily	P.O.[1]	0	---	30 days
1300.--SULFAPYRAZINE 								
Nurnberg et al., 1944	6 rats	Alstar	---	1% in food	P.O.	0	---	At least 10 weeks
1301.--SULFAPYRIDINE 								
Antopol and Hodgson, 1949	1 monkey	---	---	4 gm. per kg. body weight for 10 days	P.O.	0[2]	---	79 days
Haas et al., 1940	52 mice 36 rats	Swiss ---	--- ---	1% or 2% in food 0.5% in food	P.O. --do--	0 0	High mortality All alive at 57 days	1 mo. 57 days
Smith, 1940	Rats	---	---	100 mg. per kg. body wt. in 2% acacia suspension, daily	P.O.	0	---	30 days
1302.--SULFAPYRIDINE, SODIUM SALT 								
Chiancone, 1941	Mice Rats	Anite --do--	--- ---	0.76 gr./kg. twice daily 0.90 gr./kg. twice daily	I.P. --do--	0 0	--- ---	28 days 42 days
1303.--SULFATHIAZOLE 								
Haas et al., 1940	52 mice 36 rats	Swiss ---	--- ---	1% or 2% in food 0.5 or 1% in food	P.O. P.O.	0 0	High mortality All alive at 57 days	1 mo. 57 days
Harris and Kinn, 1945	45 rats	Anite vanderbilt	M & F	0.1-1% in food	P.O.	0	---	44-77 days
Nurnberg et al., 1944	21 rats	Alstar and Osborne-Mendel	---	1% in food	P.O.	0	---	At least 10 weeks
1304.--SULFATHIAZOLE, SODIUM SALT 								
Chiancone, 1941	Mice Rats	Anite --do--	--- ---	1.42 gm./kg. twice weekly 1.05 gr./kg. twice weekly	I.P. I.P.	0 0	--- ---	28 days 42 days

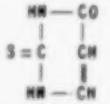
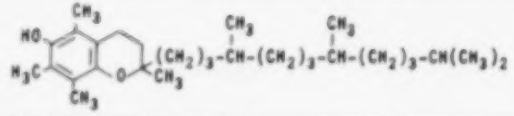
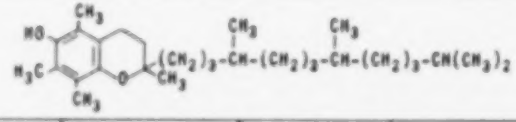
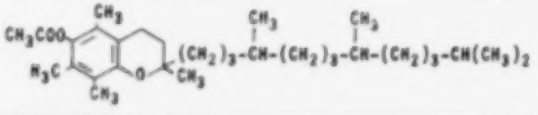
1. By stomach tube.

2. Thickening and dilatation of uterus and renal pelvis.

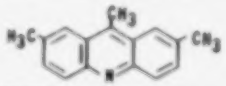
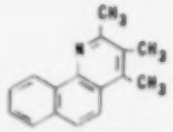
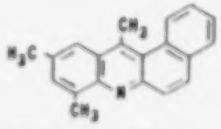
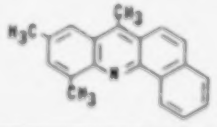
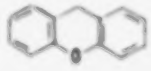
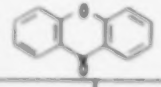
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1305.--5,7,8,9-TETRAMETHYL-3,4-BENZACRIDINE 								
Lacassagne et al., 1946	10 mice	?	M & F	0.5% in acetone twice weekly	Skin	5 sqc., 5 epi.[1]	All dead in 297 days	297 days
1306.--THIAMIN 								
McIntire et al., 1943	32 rats	---	F	80-150 micrograms per 100 g.	P.O.	0	---	4 weeks
1307.--2-THIOBARBITURIC ACID 								
Huter, 1967	Rabbit	Chinchilla	---	17.9 g. in 5 mos.	Parenterally	0	---	Ca. 5 mos.
1308.--THIOURACIL 								
Chapman, 1944	6 rats	Alpino	M	78 or 151 mg./kg. body wt. in gum-saline susp. daily	P.O.	0	---	30 days
Huges, 1944	Rats	Long-Evans	---	1-1.25 mg. daily	S.C.	0	---	At least 5 mos.
	--do--	--do--	F	In drinking water	P.O.	0	---	At least 30 days
	--do--	--do--	---	5-25 mg. once a week in drinking water	P.O.	0	---	3 weeks
Williams et al., 1944	4 rats	Wistar	---	0.25% aq. soln. of sodium salt	P.O.	0	---	60 days
Baumann and Marine, 1945	50 rats	Alpino	M & F	40-120 mg. in food	P.O.	0	---	At least 1 year
	14 rats	--do--	F	80 mg. daily in food	P.O.	0	---	--do--
Marine and Baumann, 1945	103 rats	---	M & F	0.5-1% (80 mg.) in food	P.O.	0[2]	---	512 days
Arance, Jr. et al., 1946	4 monkeys	Rhesus	F	0.1 gm. to 0.4 gm. daily	P.O.	0	---	At least 365 days
Engle and Arance, Jr., 1946	2 monkeys	Rhesus	---	0.1 gm.-0.2 gm. daily	---	0	---	85 days

1. First papilloma at 131-151 days; first epithelioma at 154-179 days.

2. Periarteritis nodosa developed in 3.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1308.--THIOURACIL (Continued) 								
Jones et al., 1946	29 rats	---	M & F	20-24 mgm.	P.O.	0[1]	---	At least 259 days
Vogel and McGavack, 1946	47 rats	Albino	---do---	0.06-0.225 gm. in food	P.O.	0	---	At least 78 days
Huter, 1947	Rabbit	Angora	---	112 mg. in 2 cc. of 1% sodium bicarbonate soln., 15 inj.	S.C.	0	---	56 days
	---do---	Cross	---	9.745 g.	S.C.	0	---	61 days
McClosky et al., 1947	12 cats	---	---	100-500 mgm./kg. daily	P.O.	0	---	At least 8 mos.
1309.--α-TOCOPHEROL 								
Baumann et al., 1942	5 rats	---	---	25 mg. per kilo of food	P.O.	0	---	8 weeks
Lundberg et al., 1944	Rats	---	F	50 mg. per ml. in ethyl esters of fatty acids of corn oil	P.O.[2]	0	---	At least 2 mos.
1310.--dl-α-TOCOPHEROL 								
Semple, 1939	10 mice	---	M	10% in sesame oil 3 times weekly	Skin	0	---	8 weeks
Dobrovolskaia-Zavadskaia and Kamnova, 1945	25 mice	---	M & F	0.5% in oil, 1 drop daily or twice weekly	P.O.	0	---	At least 109 days
1311.--dl-α-TOCOPHEROL ACETATE 								
Mauritz et al., 1944	Rats	---	M	0.5-1.0 mg. in food[3]	P.O.	0	---	At least 120 days
	---do---	---	M	5 mg. on 15th day	P.O.	0	---	---do---
	---do---	---	M	1 mg. 6-8 days	P.O.	0	---	---do---
	---do---	---	M	1 mg. 29-30 days	P.O.	0	---	---do---

1. One had lymphosarcoma.
2. By stomach tube.
3. Vitamin D deficient diet.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1312.--2,7,9-TRIMETHYLACRIDINE 								
Lacassagne et al., 1947	---	---	---	---	---	0	---	---
1313.--1,2,3-TRIMETHYL-4-AZAPHENANTHRENE 								
Lacassagne et al., 1947	---	---	---	---	---	0	---	---
1314.--5,7,9-TRIMETHYL-1,2-BENZACRIDINE 								
Lacassagne et al., 1946	10 mice	dd	M & F	0.1% in acetone twice weekly	Skin	4 pap., 3 epi.[1]	All dead at 269 days	At least 269 days
1315.--5,7,9-TRIMETHYL-3,4-BENZACRIDINE 								
Lacassagne et al., 1946	10 mice	dd	M & F	0.3% in acetone twice weekly	Skin	4 pap.[2], 2 epi.	All dead at 242 days	At least 242 days
1316.--XANTHENE 								
Allison and deEds, 1946b	Rats	---	---	In food	P.O.	0	---	---
1317.--XANTHONE 								
Allison et al., 1947b	Rats	---	---	0.2% in food	P.O.	0	---	100-640 days
1318.--XYLOSE $C_5H_{10}O_5$								
Nakahara and Mori, 1941a	Rats	---	---	In food	P.O.	0	---	---

1. First papilloma at 165-172 days; first epithelioma at 179 days.

2. First papilloma at 122 days; first epithelioma at 178 days.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1319.--YOHIMBINE HYDROCHLORIDE $C_{21}H_{26}N_2O_3 \cdot HCl$								
Bullard, 1943	35 rats	---	---	38-63 mg.	---	0	---	Ca. 103 days
Salmon and Black, 1945	120 rats	---	M & F	0.3-3 mg. daily	S.C.	0	---	15 weeks

B.--ORGANIC COMPOUNDS II.--UNCLASSIFIED

MISCELLANEOUS

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1320.--"HYDROCARBON A"[2] $C_{21}H_{16}$								
Shear, 1936a	16 mice	A	---	10 mg. crystals	S.C.	0	14 alive at 10 mos.	10 mos.
1321.--INSULIN								
Low and Ferrill, 1941	Over 37 rats	Wistar	---	20 or 40 u. per kg. body wt. daily	I.P.	0	---	612 days
1322.--INTEGERRIMINE $C_{18}H_{25}O_5N$								
Harris et al., 1942a	5 mice	---	---	40 mg./kg. body wt. daily	S.C.	0	---	8 weeks
1323.--JACOBINE $C_{18}H_{25}O_6N$								
Harris et al., 1942a	8 mice 5 mice	--- ---	--- ---	40 mg./kg. body wt. repeated injections 60 mg./kg. body wt. for 9 weeks	S.C. I.V. & S.C.	0 0	--- ---	70 days 9 weeks
1324.--LONGILOBINE $C_{18}H_{23}O_5N$								
Harris et al., 1942a	4 mice	---	---	40 mg./kg. body wt. daily	S.C.	0	---	8 weeks
1325.--MONOCROTALINE $C_{16}H_{23}O_6N$								
Harris et al., 1942b	5 mice	Albino	---	130 mg./kg. body wt. in aq. soln. thrice weekly	I.V.	0	---	7 weeks
	--do--	--do--	---	130 mg./kg. body wt. in aq. soln. 5 times weekly	S.C.	0	---	7 weeks
	--do--	--do--	---	2 mg. daily	P.O.	0	---	7 weeks
1326.--PLATYPHYLLINE $C_{18}H_{25}O_5N$								
Chen et al., 1940	2 monkeys	Rhesus	---	6.6 & 10 mg./kg. body wt. in aq. soln. of hydrochloric acid	I.V.	0	---	Over 31 days
1327.--PROLAN								
Pierson, 1936	4 rabbits	---	F	---	---	0	---	13 mos.
	3 rabbits	---	F	---	---	0	---	7 mos.
	3 rabbits	---	F[1]	Weak dose	---	0	---	--

1. Pregnant.

2. See Fieser and Seligman, 1936.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
1327.--PROLAN (Continued)								
Bischoff and Long, 1938	66 mice	Marsh-Buffalo	F	60 units monthly for 11 mos.	Parenteral	0[1]	---	At least 11 mos.
Silvestroni, 1939	5 rats	---	F, castr.	6 units in aq. soln. daily for 70 days	Inj.	0	---	70 days
Bischoff et al., 1941	42 mice	Marsh-Buffalo	F	60 units monthly in 4 injections for 12 mos.	---	0	---	19 mos.
	Mice	--do--	F	300 units monthly	---	0	---	At least 7 mos.
	32 mice	--do--	M	40-120 units monthly for 11 mos.	---	0	---	19 mos.
1328.--SENECIPHYLLINE $C_{18}H_{23}O_5N$								
Chen et al., 1940	34 mice	---	---	50-100 mg./kg. body wt. in dil. aq. soln. of HCl	I.V.	0	24 alive at 30 days	35 days
	23 guinea pigs	---	---	--do--	I.V.	0	7 alive at 30 days	--do--
1329.--SPARTIOIDINE $C_{18}H_{23}O_5N$								
Harris et al., 1942a	8 mice	---	---	60 mg./kg. body wt. weekly	I.V.	0	---	89 days
	Mice	---	---	40 mg./kg. body wt. daily	S.C.	0	---	8 weeks

ADDENDA

I. ALIPHATIC

1330.--n-BUTYL CARBAMATE $H_2N\text{-}COO(CH_2)_3CH_3$

Larsen, 1947	33 mice	A	M & F	5% soln. in water 0.01 ml. for 13 weeks (0.25 mg./g.)	I.P.	Tumors[2]	---	At least 13 weeks

1331.--β-CHLOROETHYL CARBAMATE $H_2N\text{-}COOCH_2CH_2Cl$

Larsen, 1947	46 mice	A	M & F	5% soln. in water 0.01 ml. (0.5 mg./g.) for 13 weeks	I.P.	Tumors[2]	---	At least 13 weeks

126.--l-CYSTINE

Shear and Leiter, 1941b	7 mice	Dba	M	110 mg. crystals (total dose)	S.C.	0	15 alive at 1 year, 8 alive at 18 mos.	22 mos.
	14 mice	Stock	M & F					
	12 mice	A	F					

1. No change in incidence of spontaneous tumors.

2. Of the lung, but not greater than in controls.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
126.--l-CYSTINE (Continued)								
Shear and Stewart, 1941	7 mice 14 mice 12 mice	Dba Stock A	M M & F F	Ca. 5 mg. crystals, repeated injections	S.C.	0	---	21 mos.
147.--ETHYL CARBAMATE								
Larsen et al., 1946	73 mice 43 mice	A A	M & F --do--	1 mg. per g. in water weekly, 13 times 1 mg. in tricaprylin	I.P. --do--	Tumors[1] --do--	--- ---	15 weeks --do--
Larsen, 1947	102 mice	A	M & F	5% soln. in H_2O, 0.01 ml. per mouse for 13 weeks (0.5 mg./gr.)	I.P.	Tumors[1]		At least 13 weeks
Larsen et al., 1947	120 mice	A	F	25 mg.; average dose, short period	I.P., I.V.	Tumors[1]	---	6 mos.
162.--ISOAMYL CARBAMATE								
Larsen, 1947	23 mice	A	M & F	5% soln. in water 0.01 ml. (0.5 mg./g.) for 13 weeks	I.P.	Tumors[2]	---	At least 13 weeks
1332.--ISOPROPYL CARBAMATE $H_2N\text{-}COOCH(CH_3)_2$								
Larsen, 1947	51 mice	A	M & F	5% soln. in water 0.01 ml. for 13 weeks (0.5 mg./gm.)	I.P.	Tumors[5]	---	At least 13 weeks
1333.--METHYL CARBAMATE $H_2N\text{-}COOCH_3$								
Larsen, 1947	46 mice	A	M & F	5% soln. in water, 0.01 ml. for 13 weeks (0.5 mg /gr.)[3]	I.P.	Tumors[2]	---	At least 13 weeks
182.--n-PROPYL CARBAMATE $H_2N\text{-}COOCH_2CH_2CH_3$								
Larsen, 1947	78 mice	A	M & F	5% soln. in water 0.01 ml. 13 weeks (0.5 mg./g.)	I.P.	Tumors[5]	---	At least 13 weeks
1334.--β,β,β-TRICHLORETHYL CARBAMATE $H_2N\text{-}COOCH_2CCl_3$								
Larsen, 1947	53 mice	A	M & F	5% soln. in water 0.01 ml. (125 mg./g.) for 13 weeks	I.P.	Tumors[5]	---	At least 13 weeks
2. MONOCYCLIC								
240.--2,2-BIS(p-CHLOROPHENYL)-1,1,1-TRICHLOROETHANE								
Fitzhugh and Nelson, 1947e	192 rats	Osborne-Mendel	M & F	200-800 p.p.m. in food	P.O.	0[2a]	---	Over 18 mos.
270.--4,4'-DIHYDROXY-α,β-DIETHYLSTILBENE DIPROPIONATE								
Rocco, 1942	58 guinea pigs	---	F, castr.	0.05 to 80 micrograms in 0.2 cc. olive oil thrice weekly	Inj.	Tumors[4]	---	112 days

1. Multiple adenomas of the lung.
2. Of the lung, but no greater than in controls.
2a. "Minimal hepatocarcinogenic tendency."
3. M.P. 56-57° Corr.
4. Uterine and extra-uterine.
5. Of the lung.

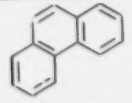
Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
299.--α,α-DIPHENYL-β-ETHYL-α-AMYLENE								
Dodds et al., 1945	50 mice	---	---	0.3% solution in benzene twice weekly	Skin	0	4 alive at 1 year	At least 1 year
300.--α,α-DIPHENYL-β-ETHYL-α-BUTYLENE								
Dodds et al., 1945	50 mice	---	---	0.3% solution in benzene twice weekly	Skin	0	8 alive at 1 year	At least 1 year
303.--α,α-DIPHENYL-β-METHYL-α-PROPYLENE								
Dodds et al., 1945	50 mice	---	---	0.3% solution in benzene twice weekly	Skin	0	9 alive at 171 days, all dead at 1 year	At least 1 year
304.--1,4-DISTYRYLBENZENE								
Dodds et al., 1945	25 mice --do--	--- ---	--- ---	0.3% in benzene soln. twice weekly --do--	Skin --do--	0 0	15 alive at 1 year All dead at 1 year	At least 1 year --do--
352.--SODIUM PENTACHLOROPHENATE								
Deichman et al., 1942	1 rabbit --do-- 6 rabbits 1 rabbit	--- --- --- ---	--- --- --- ---	0.63 mgm./kg. 2% soln.[1] 113 mgm./kg. 2 successive days[1] 10 cc. 1% soln. (40 mgm./kg.) 6 days a week 111 mgm./kg. 13 applications[1]	Skin --do-- --do-- --do--	0 0 0 0	--- --- --- ---	32 days --- 100 days 43 days
380.--α,α,β-TRIPHENYL-α-BUTYLENE								
Dodds et al., 1945	25 mice	---	---	0.3% solution in benzene twice weekly	Skin	0	19 alive after 1 year	At least 1 year

4. TRICYCLIC

484.--2-NITROFLUORENE

Green, H.N., 1944	Rats	---	---	6-8 mg. daily for 30 weeks	P.O.	0	---	42 weeks

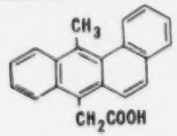
487.--PHENANTHRENE



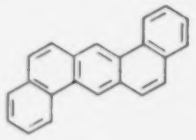
Carruthers, 1942	30 mice	Swiss	M & F	0.025 mg. in lard twice weekly	I.P.	0	---	At least 123 days
	10 rats	---	M & F	3 mg. in lard, 5 injections	I.P.	0	---	55 days
	6 mice	Swiss	---	0.3 mg. in lard biweekly	I.P.	0	---	8 weeks

5. TETRACYCLIC

709.--9-METHYL-1,2-BENZANTHRANYL-10-ACETIC ACID



1. Time of contact: 30 minutes or 1 hour.

Reference	Animal	Strain or type	Sex	Preparation and dose	Site and route	Animals with tumors	Survival	Duration of experiment
6. PENTACYCLIC								
801.--1,2,5,6-DIBENZANTHRACENE 								
Lorenz, E. and Stewart, 1947	120 mice	C57 bl., C3H, dba, A, A backcross	M & F	0.2-0.4 mg./cc. in olive oil emulsion	P.O.	Tumors[1]	---	420 days
Shimkin and Wyman, 1947	224 mice	C3H	M	0.002-0.5 mg. in cholesterol pellets	S.C.	Sarc.	Many died before 24 mos.	Ca. 24 mos.
883.--20-METHYLCHOLANTHRENE								
Lorenz, E. and Stewart, 1947	157 mice	C57 br., C57 bl., C3H, I, dba, A and A, backcross	M & F	0.4 mg./cc. in olive oil emulsion	P.O.	Tumors[1]	---	288 days

1. Carcinoma and precancerous lesions.

BIBLIOGRAPHY

A

Abadi, D.Y.: Thesis, Santiago, Chile (1943).
: Publ. med. exper. Chile 21: 1-37 (1943).
Abb, M.: Arch. f. Ohren-, Nasen- u. Kehlkopfh. 133: 17-130 (1932).
Abels, J.C., Gorham, A.T., Eberlin, S.L., Halter, R., and Rhoads, C.P.: J. Exper. Med. 76: 143-161 (1942).
Abromowitsch, I.A. *See* Magat, M.A.
Ackart, R.J., and Leavy, S.: Proc. Soc. Exper. Biol. & Med. 42: 720-724 (1939).
Acuña, J. *See* Lipschütz, A.
Adamova, N. *See* Dobrovolskaia-Zavadskaia, N.
Adams, C.O. and Sarnat, B.G.: Arch. Path. 30: 1192-1202 (1940).
Addis, T., MacKay, E.M., and MacKay, L.L.: J. Biol. Chem. 71: 157-166 (1926).
Aivasian, A.I.: Bull. biol. et med. exper. URSS. 9: 521-523 (1940).
Akamatsu, N.: Kyoto Igaku Zasshi 17: 489-515 (1920).
Albot, G. *See* Huguenin, R.
Alessandri, R.: Libro de Oro, pp. 2051-2056 (1935).
Alexander, L. *See* Seligman, A.M.
Alexin, M.: Arch. f. Gynäk. 169: 432-443 (1939).
Allen, B.M. and Bern, H.: Endocrinology 31: 586-591 (1942).
Allen, D. *See* MacBride, C.M.
Allen, E. and Gardner, W.U.: Cancer Research 1: 359-366 (1941).
Allen, E. *See* Gardner, W.U.; Overholser, M.D.; Pfeiffer, C.A.
Allen, J.G. *See* Brunschwig, A.
Allsopp, C.B.: Cancer Research 6: 24-28 (1946).
Alsberg, C.L. *See* Johns, C.O.; and Schwartze, E.W.
Amano, S.: Gann 31: 86-95 (1937).
Amano, S., and Ando, T.: Gann 33: 232-236 (1939).
: Gann 34: 169-172 (1940).
Amano, S. and Hashida, M.: Gann 35: 296-299 (1941).
Amano, S., and Tomita, T.: Gann 32: 81-83 (1938).
Ambrose, A.M.: J. Pharmacol. & Exper. Therap. 76: 245-251 (1942).
: J. of Med. Hyg. & Toxicol. 25: 26-28 (1943).
Ambrose, A.M., de Eds, F. and Cox, A.J., Jr.: J. Pharmacol. 78: 90-92 (1943).
Ambrose, A.M. *See* Haag, H.B.
Anderson, R.C. *See* Chen, K.K.; Harris, P.N.
Andervont, H.B.: Pub. Health Rep. 49: 620-624 (1934).
: Pub. Health Rep. 50: 1211-1217 (1935).
: Pub. Health Rep. 51: 591-600 (1936).
: Pub. Health Rep. 52: 212-221 (1937a).
: Pub. Health Rep. 52: 304-315 (1937b).
: Pub. Health Rep. 52: 1584-1589 (1937c).
: "Some Fundamental Aspects of the Cancer Problem," The Science Press. New York, pp. 62-66 (1937d).
: Pub. Health Rep. 53: 229-232 (1938a).
: Pub. Health Rep. 53: 232-237 (1938b).
: Pub. Health Rep. 53: 1647-1665 (1938c).
: Pub. Health Rep. 53: 1665-1671 (1938d).
: Pub. Health Rep. 54: 1158-1169 (1939a).
: Pub. Health Rep. 54: 1512-1519 (1939b).
: Pub. Health Rep. 54: 1524-1529 (1939c).
: Pub. Health Rep. 54: 1529-1533 (1939d).
: Pub. Health Rep. 54: 1986-1991 (1939e).
: J. Nat. Cancer Inst. 1: 135-145 (1940).
: J. Nat. Cancer Inst. 7: 431-432 (1947).
Andervont, H.B., and Dunn, T.B.: J. Nat. Cancer Inst. 7: 730 (1947a).
: J. Nat. Cancer Inst. 7: 455-461 (1947b).
: Cancer Research 7: 770 (1947c).
Andervont, H.B. and Edwards, J.E.: J. Nat. Cancer Inst. 2: 139-149 (1941).
: J. Nat. Cancer Inst. 3: 349-354 (1943a).
: J. Nat. Cancer Inst. 3: 355-358 (1943b).
Andervont, H.B., Grady, H.G. and Edwards, J.E.: J. Nat. Cancer Inst. 3: 131-153 (1942).
Andervont, H.B. and Lorenz, E.: Pub. Health Rep., 52: 637-647 (1937a).
: Pub. Health Rep., 52: 1931-1940 (1937b).
Andervont, H.B. and Shear, M.J.: J. Nat. Cancer Inst. 2: 333-334 (1942).
Andervont, H.B. and Shimkin, M.B.: J. Nat. Cancer Inst. 1: 225-239 (1940).
: J. Nat. Cancer Inst. 1: 349-353 (1941).
Andervont, H.B., White, J. W., and Edwards, J.E.: J. Nat. Cancer Inst. 4: 583-586 (1944).
Andervont, H.B. *See* Brues, A.M.; Lorenz, E.; Nathanson, I.T.; Shimkin, M.B.
Ando, T.: Gann 32: 252-258 (1938).
: Gann 33: 229-232 (1939).
: Gann 34: 371-373 (1940).
: Gann 35: 50-52 (1941a).
: Gann 35: 62-63 (1941b).
: Gann 35: 201-204 (1941c).

: Gann 35: 304-307 (1941d).
Ando, T. *See* Amano, S.
Andrews, F.N. *See* Kirkpatrick, C.M.
Anissimova, V.: Am. J. Cancer 36: 229-232 (1939).
Anissimova, V. *See* Falin, L.I.
Anitschkow, N.: Beitr. z. path. Anat. u.z. allg. Path. 56: 379-404 (1913a).
: Centralbl. f. allg. Path. u. path. Anat. 24: 618 (1913b).
: Beitr. z. path. Anat. u.z. allg. Path. 57: 201-222 (1914).
Anitschkow, N. and Chalatow, S.: Centralbl. f. allg. Path. u. path. Anat. 24: 1-9 (1913).
Ansbacher, S., Carwin, W.C. and Thomas, B.G.H.: J. Pharmacol. and Exper. Therap. 75: 111-124 (1942).
Antopol, W., and Robinson, H.: Proc. Soc. Exper. Biol. & Med. 40: 428-430 (1939).
Antopol, W. and Unna, K.: Cancer Research 2: 694-696 (1942).
Aoji, S.: Jap. J. Obst. & Gynec. (Kinki Fujinka Z.) 19: 337-347 (1936a).
: Jap. J. Obst. & Gynec. 19: 457-466 (1936b).
Araki, A.: Osaka Igaku Zasshi 36: 363 (1937). Cited by Kinosita, 1937.
Araki, M., Miyake, S. and Takoaka, K. Gann 35: 344-345 (1941).
Araki, M. and Shirota, S.: Gann 34: 201-202 (1940).
Araki, M. *See* Miyake, S.
Aranow, H., Jr., Engle, E.T. and Sperry, W.M.: Endocrinology 38: 331-336 (1946).
Aranow, H., Jr. *See* Engle, E.T.
Arenas, N. *See* Sammartino, R.
Arguello, R.A.: Rev. Soc. argent. de biol., 12: 468-475 (1936).
Armstrong, E.C. and Bonser, G.M.: J. Path. & Bact. 56: 507-512 (1944).
: Brit. J. Exper. Path. 27: 97-102 (1946).
: J. Path. & Bact. 59: 19-27 (1947).
Arnold, F.A., Jr. and McClure, F.J.: J. Dent. Research 20: 457-463 (1941).
Arnold, H. and Zimmerman, H.M.: Cancer Research 3: 682-685 (1943).
Arnold, H. *See* Zimmerman, H.M.
Arnold, O.: Klin. Wchnschr., 18: 891-892 (1939).
Arnold, O.H., Grumbrecht, P., and Loeser, A.: Arch. f. exper. Path. u. Pharmakol. 191: 192-211 (1938).
Arnold, O., Hamperl, H., Holtz, F., Junkmann, K., and Marx, H.: Arch. f. exper. Path. u. Pharmakol. 186: 1-21 (1937).
Artom, C. *See* Morehead, R.P.
Ashburn, L.L., Daft, F.S., Endicott, K.M. and Sebrell, W. H.: Pub. Health Rep. 57: 1883-1891 (1942).
Ashburn, L.L. *See* Daft, F.S.; Spicer, S.S.
Askanazy, M.: Verhandl. d. deutsch. path. Gesellsch. 21: 182-195 (1926).
: Wien. klin. Wchnschr. 50: 816-822 (1937).
Astwood, E.B., Geschickter, C.F., and Rausch, E.O.: Am. J. Anat. 61: 373-406 (1937).
Atchley, D.W. *See* Kuhlmann, D.
Athias, M.: Compt. rend. Soc. de biol. 126: 585-587 (1937).
Athias, M. and Furtado-Dias, M.T.: Compt. rend. Soc. de biol. 127: 237-238 (1938).
: Acta. Union internat. contre cancer 4: 659-663 (1939).
: Bull. Assoc. franç. p. l'étude du cancer 29: 90-93 (1940).
Aub, J.C. *See* Dunlap, C.E.; Franseen, C.C.; Wislocki, G.B.
Aull, J.C. *See* Kinard, F.W.
Axelrod, A.E. *See* Gross, P.

B

Babcock, R.S. *See* Suntzeff, V.
Bach, E.: Klin. Wchnschr. 16: 280 (1937).
Bachman, C., Collip, J.B., and Selye, H.: Proc. Roy. Soc., London, s.B. 117: 16-21 (1935).
Bachmann, W.E., and Bradbury, J.T.: J. Org. Chem. 2: 175-182 (1937).
Bachmann, W.E., Cook, J.W., Dansi, A., deWorms, C.G.M., Haslewood, G.A.D., Hewett, C.L., and Robinson, Mrs. A. M.: Proc. Roy. Soc., London. s.B. 123: 343-368 (1937).
Bachmann, W.E., Kennaway, E.L., and Kennaway, N.M.: Yale J. Biol. & Med. 11: 97-102 (1938).
Bachmann, W.E. *See* Bradbury, J.T.
Badger, E.A. *See* Schmidt, L.H.
Badger, G.M. and Cook, J.W.: J. Chem. Soc., 409-412 (1940).
Badger, G.M., Cook, J.W., Hewett, C.L., Kennaway, E.L., Kennaway, N.M. (Mrs.), Martin, R.H., and Robinson, A. M. (Mrs.): Proc. Roy. Soc., London, s.B. 129: 439-467 (1940).
: Proc. Roy. Soc., London, s.B. 131: 170-182 (1942).
Badoche, M.: Compt. rend. Acad. d. sc. 194: 1086-1088 (1932).
Baeten, G. *See* Daels, F.
Baeza-Herrera, H. *See* Lipschütz, A.
Baeza-Rosales, H. *See* Lipschütz, A.

Bagg, H.J.: Am. J. Cancer 26: 69-84 (1936).
Baglioni, T.: Tumori 16: 402-423 (1942).
Bailey, C.H.: Proc. Soc. Exper. Biol. & Med. 12: 68-70 (1914).
: Proc. Soc. Exper. Biol. & Med. 13: 60-62 (1915).
Bailey, P. *See* Sweet, W.H.
Baldwin, F.M. *See* Li, M.H.
Ball, G.H.: J. Endocrinology 3: 302-309 (1943).
Ball, H.J.: Am. J. Cancer, 26: 69-84 (1936).
Ball, J.: Endocrinology 23: 197-199 (1938).
Balli, V. *See* de Gaetani, G.
Bang, F.: Leeuw.-Vereen. 4: 9 (1937).
Banting, F.G.: Proc. Roy. Soc. Med. 32: 245-254 (1939).
Barker, M.H. *See* Lindberg, H.A.
Barnes, B.O., Regan, J.F., and Nelson, W.O.: J.A.M.A. 101: 926-927 (1933).
Barnes, R.H. *See* Lundberg, W.O.
Barnes, W.A., and Furth, J.: Am. J.Cancer 30: 75-94 (1937).
Barnes, W.A. *See* Furth, J.
Barrat, P. *See* Berge, C.
Barrett, F.N. *See* Sykes, J.F.
Barrett, M.K. and Larsen, C.D.: J. Nat. Cancer Inst. 4: 595-600 (1944).
Barry, G., and Cook, J.W.: Am. J. Cancer 20: 58-69 (1934).
Barry, G., Cook, J.W., Haslewood, G.A.D., Hewett, C.L., Hieger, I., and Kennaway, E.L.: Proc. Roy. Soc., London, s.B. 117: 318-351 (1935).
Barth, F. *See* Laubender, W.
Bassett, A.M. *See* Craig, F.N.
Bauer, J.: J.A.M.A. 109: 1442-1444 (1937).
Bauer, J., and KunewÄlder, E.: Wien klin. Wchnschr. 50: 399-401 (1937).
Bauer, J., KunewÄlder, E., and Schächter, F.: Wien. klin. Wchnschr. 49: 39-40 (1936).
Bauer, J., KunewÄlder, E., and Schächter, F.: Wien. klin. Wchnschr. 50: 83-87 (1937).
Bauer, T.: Verhandl. d. deutsch. Gesellsch. f. Urol., 7 kong., pp. 360-399 (1926).
Baumann, C.A., Foster, E.G. and Lavik, P.S.: J. Nutrition 21: 431-444 (1941).
Baumann, C.A., Foster, E.G. and Moore, P.R.: J. Biol. Chem. 142: 597-608 (1942).
Baumann, C.A., Jacobi, H.P., and Rusch, H.P.: Am. J. Hyg. 30A: 1-6 (1939).
Baumann, C.A. and Rusch, H.P.: Am. J. Cancer 35: 213-221 (1939).
Baumann, C.A., Rusch, H.P., Kline, B.E. and Jacobi, H.P.: Am. J. Cancer 38: 76-80 (1940).
Baumann, C.A. *See* Clayton, C.C.; Field, J.B.; Giese, J.E.; Jacobi, H.P.; Kline, B.E.; Lavik, P.S.; Miller, E.C.; Miller, J.A.; Miner, D.L.; Rusch, H.P.
Baumann, E.J. and Marine, D.: Endocrinology 36: 400-405 (1945).
Baumann, E.J. *See* Marine, D.
Beard, H.H. *See* Pizzolato, P.
Beard, R.R. *See* McNaught, J.B.
Beck, S.: Brit. J. Exper. Path. 19: 319-323 (1938).
: Brit. J. Exper. Path. 21: 133-135 (1940).
: Brit. J. Exper. Path. 27: 155-157 (1946).
Beck, S., Kirby, A.H.M. and Peacock, P.R.: Cancer Research 5: 135-139 (1945).
Beck, S. and Peacock, P.R.; Brit. J. Exper. Path. 21: 227-230 (1940).
Becker, C. *See* Lipschütz, A.
Becks, H., Simpson, M.F., Marx, W., Li, C.J. and Evans, H.M.: Endocrinology 34: 305-310 (1944a).
: Endocrinology 34: 311-316 (1944b).
Becks, H. *See* Simpson, M.E.
Beeckmans, M.L. *See* Maisin, H.J.
Belkin, M.: Cancer Research 2: 269-275 (1942).
Bell, E.T. *See* Kirschbaum, A.K.
Bell, G.H. and Cuthbertson, D.P.: J. Endocrinol. 3: 302-309 (1943).
Bellolio, P.Z.: Publ. med. exper. Chile 2: 1-31 (1939).
Bellolio, P.Z. *See* Lipschütz, A.
Beltrami, W.: Tumori 21 (new ser. 9): 537-547 (1935).
Beltrami, W.: Tumori 14: 41-47 (1940).
Beltrami, W. *See* Rondoni, P.
Benaglia, A.E., Robinson, E.J., Utley, E. and Cleverdon, M.A.: J. Indust. Hyg. & Toxicol. 25: 175-180 (1943).
Benecke, E., and Schröder, J.: Ztschr. f. Krebsforsch. 49: 505-514 (1939).
Bengis, R. *See* Salant, W.
Bennetz, H. *See* Courrier, R.
Benson, W.M. *See* Mattis, P.A.
Benthin, W.: Ztschr. f. Krebsforsch. 10: 227-234 (1911).
Ber, A. *See* Flaks, J.
Ber, L.S.: Voprosi Onkologii, Medgiz. Narkomzdrav, Moscow, (1940) pp. 344-347.
Ber, L.S. *See* Pisareva, T.A.
Berenblum, I.: J. Path. & Bact. 40: 549-558 (1935).
: Cancer Research 1: 44-48 (1941a).
: Cancer Research 1: 807-814 (1941b).
: Cancer Research 5: 265-268 (1945).
Berenblum, I. and Bonser, G.M.: J. Indust. Hyg. & Toxicol. 19: 86-92 (1937).

Berenblum, I. and Kendal, L.P.: Brit. J. Exper. Path. 15: 366-371 (1934).
: Biochem. J. 30: 129-132 (1936).
Berenblum, I. and Schoental, R.: Cancer Research 3: 145-150 (1943).
Berge, C. and Barrat, P.: Arch. Inst. Pasteur de Tunis 29: 437-449 (1940).
Bergmann, H. *See* Levine, M.
Bergmann, W., Stavely, H.E., Strong, L.C. and Smith, G.M.: Am. J. Cancer 38: 81-85 (1940).
Bergmann, W., Strong, L.C. and Smith, G.M.: Yale J. Biol. & Med. 11: 39-44 (1938).
Bergmann, W. *See* Skau, E.L.
Bern, H. *See* Allen, B.M.
Bernard, J.: Polyglobulies et leucémies provoquées par les injections intra-médullaires de goudron. 190 pp. Paris (1936).
Berry, G.P. *See* Syverton, J.T.
Bersin, T. *See* Lauber, H.J.
Bertellotti, L.: Atti d. soc. studio di dermat. e sif. 1: 1018 (1938)
: Arch. ital. di med. sper. 4: 97-124 (1939).
Bertrand, I., and Gruner, J.: Bull. Assoc. franç. p. l' étude du cancer 27: 697-705 (1938a).
: Compt. rend. Soc. de biol. 128: 637-638 (1938b).
Bessemans, A. and Maisin, J.: Bull. Assoc. franç. p. l'étude du cancer 29: 275-281 (1940-41).
Bialet-Laprida, Z.: Compt. rend. Soc. de biol. 114: 377-380 (1933a).
: Compt. rend. Soc. de biol. 114: 381-382 (1933b).
: Compt. rend. Soc. de biol. 114: 383-384 (1933c).
: Compt. rend. Soc. de biol. 117: 456-457 (1934).
Biddulph, C.: Anat. Research 73: 447-463 (1939).
Bidear, J. *See* Sabrazès, J.
Biedermann, K.: Arch. f. Gynäk. 167: 465-488 (1938).
Bielschowsky, F.: Biochem. J. 37: 15 (XV) (1943).
: Brit. J. Exper. Path. 25: 1-4 (1944a).
: Brit. J. Exper. Path. 25: 90-95 (1944b).
: Brit. J. Exper. Path. 27: 54-61 (1946).
: Brit. J. Cancer 1: 146-151 (1947).
Bielschowsky, F. and Green, H.N.: Nature 156: 780 (1945).
Bierich, R.: Leeuw.-Vereen. 1: 14-17 (1922).
Biesele, J.J. and Cowdry, E.V.: J. Nat. Cancer Inst. 4: 373-384 (1944).
Biltris, R.: Bull. Assoc. franç. p. l'étude du cancer 22: 438-468 (1933).
Biltris, R. *See* Daels, F.
Bing, R.J., McNamara, B. and Hopkins, F.H.: Bull. Johns Hopkins Hosp. 78: 308-315 (1946).
Bird, H.R.: *See* Marsden, S.J.
Bisceglie, V.: Boll. Soc. med.-chir., Catania 5: 10-23 (1936a).
: Boll. Soc. med.-chir., Catania 5: 24-33 (1936b).
: Boll. Soc. med.-chir., Catania 5: 34-42 (1936c).
: Baglivi 31: 52-65 (1937a).
: Riv. di pat. sper. 8 (new ser.): 75-83 (1937b).
: Rev. sud-am. de endocrinol. 21: 714-716 (1938).
Bischoff, F., Ingraham, L.P. and Clarke, G.J.: Cancer Research 5: 579-581 (1945).
Bischoff, F., and Long, M.L.: Endocrinology 23: 327-329 (1938).
: Am. J. Cancer 37: 531-535 (1939).
Bischoff, F., Long, M.L. and Rupp, J.J.: Am. J. Cancer 38: 404-405 (1940).
: Endocrinology 28: 769-779 (1941).
Bischoff, F., Long, M.L., Rupp, J.J. and Clarke, G.J.: Cancer Research 2: 52-55 (1942a).
: Cancer Research 2: 198-199 (1942b).
Bischoff, F. and Rupp, J.J.: Cancer Research 6: 403-409 (1946).
Biskind, G.R.: Endocrinology 28: 894-896 (1941a).
: Proc. Soc. Exper. Biol. & Med. 46: 452-453 (1941b).
Biskind, G.R. *See* Lisco, H.
Bissell, A.D. *See* Brunschwig, A.
Bissell, G.W. *See* Williams, R.H.
Bittner, J.J.: Cancer Research 1: 290-292 (1941).
Bittner, J.J. *See* Kirschbaum, A.
Black, R. *See* Sulman, F.
Blanchard, E.W. and Stebbins, R.B.: Endocrinology 36: 297-304 (1945).
Blanchard, E.W. *See* Stebbins, R.B.
Bliss, C.I. *See* Fitzhugh, O.G.
Bloch, B.: Leeuw.-Vereen. 1: 46-48 (1922).
Block, W.D., Buchanan, O.H. and Freyberg, R.H.: J. Pharm. & Exper. Therap. 82: 391-398 (1944).
Blokhina, A.N. *See* Mikhailov, B.M.
Blumenfeld, C.M.: Arch. Path. 35: 667-673 (1943).
Blumklotz, B. *See* Weil, A.
Bogart, R., Lasley, J.F., and Mayer, D.T.: Endocrinology 35: 173-181 (1944).
Bogen, E., and Loomis, R.N.: California & West. Med. 43: 135-138 (1935).
Bogliolo, L.: Pathologica. 29: 372-376 (1937).

: Pathologica. 30: 422-430 (1938).
Bolliger, A. and Canny, A.J.: Med. J. Australia *i*, 697-699 (1941).
Bolliger, A. *See* Carrodus, A.
Bollman, J.L. and Mann, F.C.: Ann. Int. Med. 5: 699-712 (1931).
Bomford, R.R.: Brit. M.J. *ii*, 549-551 (1940).
Bonne, C., Van Veen, A.G. and Tjokronegoro, S.: Geneesk. Tijdschr. v. Nederl.-Indië 81: 3448-3458 (1941).
Bonser, G.M.: J. Path. & Bact. 41: 217-218 (1935).
: J. Path. & Bact. 42: 169-181 (1936).
: J. Path. & Bact. 46: 581-602 (1938).
: Am. J. Cancer 38: 319-327 (1940).
: J. Path. & Bact. 54: 149-154 (1942).
: J. Path. & Bact. 55: 1-6 (1943).
: J. Path. & Bact. 56: 15-26 (1944).
Bonser, G.M. and Orr, J.W.: J. Path. & Bact. 49: 171-193 (1939).
Bonser, G.M. and Robson, J.M.: J. Path. & Bact. 51: 9-22 (1940).
Bonser, G.M., Stickland, L.H., and Connal, K.I.: Brit. Emp. Cancer Camp., 14th Ann. Rep., pp. 75-76 (1937a).
: J. Path. & Bact. 45: 709-711 (1937b).
Bonser, G.M. and Wainman, L.M.: J. Path. & Bact. 50: 548-550 (1940).
: J. Path. & Bact. 52: 263-266 (1941).
Bonser, G.M. *See* Armstrong, E.C.; Robson, J.M.; Sorenblum, I.
Boon, M.C. *See* Furth, J.; McEndy, D.P.
Borchardt, E. *See* Laqueur, E.
Bosse, M.E. *See* Gross, P.
Boström, G.: Acta radiol. 16: 224-232 (1935).
Bottomley, A.C. and Folley, S.J.: Proc. Roy. Soc., London, s.B. 126: 224-241 (1938).
Bottomley, A.C., and Twort, C.C.: Am. J. Cancer 21: 781-786 (1934).
Bottomley, A.C. *See* Twort, C.C.
Boughton, L.L. and Stoland, O.O.: J. Am. Pharm. A. 32: 187-191 (1943).
Bourne, G. and Zuckerman, S.: J. Endocrinol. 2: 268-282 (1941).
Boyd, L.J. *See* McGavak, T.H.
Boyland, E. and Brues, A.M.: Proc. Roy. Soc., London, s. B. 122: 429-441 (1937).
Boyland, E. and Burrows, H.: J. Path. & Bact. 41: 231-238 (1935).
Boyland, E., Levi, A.A., Mawson, E.H. and Roe, E.: Biochem. J. 35: 184-191 (1941).
Boyland, E. and Mawson, E.H.: Biochem. J. 32: 1460-1466 (1938).
Boyland, E., and Warren, F.L.: J. Path. & Bact. 45: 171-177 (1937).
Boyland, E. *See* Burrows, H.
Bradbury, J.T.: Univ. Hosp. Bull., Ann Arbor 2: 63-64 (1936).
: Endocrinology 28: 101-106 (1941).
Bradbury, J.T., Bachmann, W.E. and Lewisohn, M.G.: Cancer Research 1: 685-698 (1941).
Bradsher, C.K. *See* Harris, P.N.
Branch, C.F.: Am. J. Cancer 26: 110-114 (1936).
Branch, C.F. *See* Morton, A.A.
Braun, H.A. and Cartland, G.F.: J. Am. Pharm. A. 25: 746-749 (1936).
Braun, H.A. *See* Lusky, M.L.
Breipohl, W. *See* Clauberg, C.
Briggs, F.A. *See* Hueper, W.C.
Briggs, R.W.: Nature 146: 29 (1940).
Brimi, R. *See* Levey, S.
Brindley, P. *See* Selle, W.A.
Brock, N., Druckrey, H., and Hamperl, H.: Arch. f. exper. Path. u. Pharmakol. 189: 709-731 (1938).
: Arch. f. klin. Chir. 194: 250-263 (1939).
: Ztschr. f. krebsforsch. 50: 431-456 (1940).
Brotzge, G.C. *See* Fardon, J.C.
Brown, J.B. *See* György, P.
Brown, R.A. *See* Emmett, A.D.
Browning, C.H., Cohen, J.B., Cooper, K.E., Ellingsworth, S. and Gulbransen, R.: Proc. Roy. Soc., London, s.B. 113: 308-307 (1933).
Browning, C.H., Gulbransen, R., and Niven, J.S.F.: J. Path. & Bact. 42: 155-159 (1936).
Brues, A.M., Weiner, A.E., and Andervont, H.B.: Proc. Soc. Exper. Biol. & Med. 42: 374-377 (1939).
Brues, A.M. *See* Boyland, E.; Lisco, H.
Bruger, M. *See* Ludden, J.B.
Brumer, F.H. *See* Thomas, H.E.
Brunschwig, A.: Am. J. Cancer 34: 540-542 (1938).
Brunschwig, A. and Allen, J.G.: Cancer Research 4: 45-54 (1944).
Brunschwig, A. and Bissell, A.D.: Arch. Surg. 36: 53-60 (1938).
Brunschwig, A. and Tschetter, D.: Proc. Soc. Exper. Biol. & Med. 36: 439-441 (1937).
Brunschwig, A., Tschetter, D., and Bissell, A.D.: Ann. Surg. 106: 1084-1088 (1937).

Brunschwig, A., Tschetter, D., Hamann, A.: Am. J. Cancer 38: 50-54 (1940).
Brunschwig, A. See Leroy, G.V.; Van Prohaska, J.
Bruzzone, S., Borel, H. and Schwarz, J.: Endocrinology 39: 194-202 (1946).
Bruzzone, S. See Lipschütz, A.; Quintana, U.
Bryan, W.R. and Shimkin, M.B.: J. Nat. Cancer Inst. 3: 503-521 (1943).
Bryan, W.R. See Shimkin, M.B.; Wolfe, J.M.
Buchanan, O.H. See Block, W.D.
Bucher, N.L.R.: Proc. Soc. Exper. Biol. & Med. 63: 294-295 (1946).
Bulliard, H. and dos Ghali, J.: Compt. rend. Soc. de biol. 137: 33-34 (1943).
Bulliard, H., and Ravina, A.: Compt. rend. Soc. de biol. 127: 525-528 (1938).
Bullock, F.D., Curtis, M.R., and Dunning, W.F.: Am. J. Cancer 30: 355-361 (1937).
Bullock, F.D., and Rohdenburg, G.L.: J. Cancer Research 3: 237-274 (1918).
Bullock, F.D. See Dunning, W.F.
Burbank, R. See Rume, F.M.; Korenchevsky, V.
Burch, J.C. See Cleveland, R.; Wolfe, J.M.
Burdette, W.J.: Cancer Research 3: 318-320 (1943).
Burdette, W.J. and Strong, L.C.: Cancer Research 1: 939-941 (1941).
: Cancer Research 3: 13-20 (1943).
Burk, D., Spangler, J.M., du Vigneaud, V., Kensler, C., Sugiura, K. and Rhoads, C.P.: Cancer Research 3: 130-131 (1943).
Burk, D. See du Vigneaud, V.
Burke, A.D. See Heller, V.G.
Burns, E.L. and Schenken, J.R.: Proc. Soc. Exper. Biol. & Med. 40: 497-498 (1939).
: Proc. Soc. Exper. Biol. & Med. 43: 608-610 (1940).
Burns, E.L., Suntzeff, V., and Loeb, L.: Am. J. Cancer 32: 534-544 (1938).
Burns, E.L. See Loeb, L; Schenken, J.R.; Suntzeff, V.; Reynolds, C.
Burr, G.O. See Lundberg, W.O.
Burr, H.S., Smith, G.M. and Strong, L.C.: Yale J. Biol. & Med. 12: 711-712 (1940).
Burr, H.S., Strong, L.C., and Smith, G.M.: Yale J. Biol. & Med. 10: 539-544 (1938).
Burrill, M.W. and Green, H.H.: Endocrinology 30: 142-145 (1942).
Burrows, H.: Proc. Roy. Soc., London, s.B. 111: 238-247 (1932).
: Am. J. Cancer 17: 1-6 (1933).
: Am. J. Cancer 23: 490-512 (1935a).
: Am. J. Cancer 24: 613-616 (1935b).
: Brit. J. Surg. 23: 191-213 (1935c).
: J. Path. & Bact. 41: 218-219 (1935d).
: Am. J. Cancer 28: 741-745 (1936a).
: J. Path. & Bact. 42: 161-168 (1936b).
: J. Path. & Bact. 42: 121-126 (1936c).
: J. Path. & Bact. 43: 427-428 (1936d).
Burrows, H. and Boyland, E.: Am. J. Cancer 32: 367-382 (1938).
Burrows, H. and Cook, J.W.: Am. J. Cancer 27: 267-278 (1936).
Burrows, H., Dodds, E.C., and Kennaway, N.M.: Nature, London 131: 801-802 (1933).
Burrows, H., Hieger, I., and Kennaway, E.L.: Am. J. Cancer 16: 57-67 (1932).
: J. Path. & Bact. 43: 419-426 (1936).
Burrows, H. and Koch-Ligeti, C.: Cancer Research 6: 608-609 (1946).
burrows, H., and Kennaway, N.M.: Am. J. Cancer 29: 48-57 (1934).
Burrows, H. and Maynecord, W.V.: Am. J. Cancer 31: 484-485 (1937).
Burrows, H., Roe, E.M.F. and Schober.: Cancer Research 5: 524-538 (1945).
Burrows, H. See Boyland, E.
Buschke, A. and Langer, E.: Ztschr. f. Krebsforsch. 21: 1-10 (1923).
Buschke and Peiser: Deutsche med. Wchnschr. 48: 1466 (1922).
Buschke, A. and Peiser, H.: Ztschr. f. Krebsforsch. 21: 11-18 (1923).
Butenandt, A., and Kudssus, H.: Ztschr. f. physiol. Chem. 253: 1-111 (1938).
Butenandt, A. and Suranyi, L.A.: Ber. d. deutsch. chem. Gesellsch. 75: 597-606 (1942).
Bun-Hoï, N.P., Lacassagne, A., Lecoq, J. and Rudali, G.: Compt. rend. Soc. de biol. 139: 485-486 (1945).
Bun-Hoï, N.P. See Lacassagne, A.; Rudali, G.
Buvailo, S.A. See Shabad, L.M.
Byrnes, E.W. See Geschickter, C.F.

Cabot, S., Shear, M. & Shear, M.J.: Am. J. Path. 16: 301-312 (1940).
Cacymaex, P. See Maisin, J.
Cagniant, P. See Lacassagne, A.
Calatroni, C.J.: Compt. rend. Soc. de biol. 117: 452-453 (1934).
Calatroni, C.J. See Del Castillo, E.B.
Calvery, H.O., Laug, E.P., and Morris, H.J.: J. Pharmacol. & Exper. Therap. 64: 364-387 (1938).
Calvery, H.O. See Finner, L.L.; Grant, R.L.; Fitzhugh O.G.; Draize, J.H.; Nelson, A.A.; Morris, H.J.
Cameman, J. and Maisin, J.: Acta biol. belge 1: 315-322 (1941).
Cameman, J. See Maisin, J.
Cameron, A.T., and Meltzer, S.: Am. J. Cancer 30: 55-69 (1937).
Cameron, A.T., Meltzer, S. and Lederman, J.M.: Canad. J. Research 23: Sect D.F. (1945).
Campbell, J.A.: Brit. Med. J. 11: 275-280 (1940).
: Brit. Med. J. 1: 212-221 (1942).
: Brit. Med. J. 1: 179-183 (1943).
Campbell, M. See Wolfe, J.M.
Campbell, W.P. See Fieser, L.F.
Candee, C.F. See Reinhard, M.C.
Canny, A.J.: See Holliger, A.
Cano, R.N.: Publ. méd. exper. Chile 23: 1-61 (1943).
Cantarow, A., Paschkis, K.E., Stasney, J. and Rothenberg, M.S.: Cancer Research 6: 610-616 (1946).
Cantarow, A.: See Rakoff, A.E.
Cardeza, A.F. See Houssay, B.A.
Carlson, A.J. See Johnson, V.
Carmichael, E.B. and Thompson, W.D.: Proc. Soc. Exper. Biol. & Med. 46: 233-5 (1941).
Carnes, W.H., Ragan, C., Ferrebee, J.W. & O'Neill, J.: Endocrinology 29: 144-149 (1941).
Carr, C.J.: Brit. J. Cancer 1: 152-156 (1947a).
: Proc. Soc. Exper. Biol. & Med. 65: 189-191 (1947b).
Carr, C.J. See Ellis, F.W.
Carrasco, R.: Publ. méd. exper. Chile 8: 5-25 (1943).
Carrasco, R. See Lipschütz, A.
Carrel, A.: Compt. rend. Soc. de biol. 93: 1083-1085 (1925).
: Compt. rend. Soc. de biol. 93: 1278-1280 (1925).
Carrodus, A. and Holliger, A.: M. J. Australia 11: 633-641 (1939).
Carruthers, C.: J. Biol. Chem. 123: xlx (1938).
: Am. J. Cancer 35: 546-553 (1939).
: Arch. Path. 30: 1184-1191 (1940).
: Cancer Research 2: 168-174 (1942).
Carruthers, C. and Suntzeff, V.: J. Biol. Chem. 155: 459-464 (1944).
: J. Biol. Chem. 159: 647-651 (1945).
: Cancer Research 6: 8-10 (1946).
Carruthers, C. See Simpson, W.L.; Suntzeff, V.
Carter, N.M. See Larr, H.L.A.
Cartland, G.F. See Braun, H.A.; Vander Brook, M.J.
Carwin, C.W. See Ansbacher, S.
Cary, M.K. See Williams, G.Z.
Cason J. and Fieser, L.F.: J.A.C.S. 62: 2681-2687 (1940).
: J.A.C.S. 63: 1256-1258 (1941).
Castellano, S.A., and D'Amour, F.E.: Proc. Soc. Exper. Biol. & Med. 55: 281-283 (1944).
Castelnuovo, G.S. See Seager, L.D.
Casteuil, E.R. See Cornil, L.
Caucheix, J. See Moricard, R.
Cestari, A.: Sperimentale Arch. di biol. 92: 441-452 (1938).
Ceulemans, G. See Maisin, J.
Chalovitch, N. and Froniceirc, N.: Acta Path. Neogra. 2: 223-234 (1938a).
Chalovitch, N. and Miletitch, D.L.: Acta Path. Neogra. 2: 183-194 (1938b).
Chalovitch, N., Vichnjitch, M. and Ignjatchev, J.: Libro de Oro, pp. 205-216 (1935).
Chalatow, S.S.: Beitr. z. path. Anat. u.z. allg. Path. 57: 85-111 (1914).
Chalatow, S.: See Anitschkow, N.
Chaletskaia, F.M. See Khaletskaia, F.M.
Chalmers, J.G.: Biochem. J. 28: 1214-1218 (1934).
: Biochem. J. 34. 678-684 (1940).
Chalmers, J.G. and Crowfoot, D.: Biochem. J. 35: 1270-1275 (1941).
Chamorro, A.: Compt. rend. Soc. de biol. 137: 87-88 (1943a).
: Compt. rend. Soc. de biol. 137: 110 (1943b).
: Compt. rend. Soc. de biol. 137: 325-326 (1943c).
: Compt. rend. Soc. de biol. 138: 71-74 (1944).
Chamorro, A. See Lacassagne, A.
Champy, C.: Bull. Assoc. franç. p. l'étude du cancer 26: 472-482 (1937a).
: Compt. rend. Soc. de biol. 125: 934-935 (1937b).
Chapman, C.J.: Quart. J. Pharm. & Pharmacol. 17: 314-318 (1944).

Charipper, H.A. See Keston, A.S.
Chaume, J.: Rev. chilena de hig. y med. prev. 3: 75-82 (1940).
Chaume, J. and Vargas, L. Jr.: Rev. chilena de hig. y med. prev. 3: 83-90 (1940).
Chaume, J. See Lipschütz, A.; Vargas, L. Jr.
Chen, K.K. and Anderson, R.C.: J. Pharmacol. & Exper. Therap. 91: 157-160 (1947).
Chen, K.K., Harris, P.N. and Rose, C.L.: J. Pharmacol. 68: 130-140 (1940).
Chen, K.K. See Harris, P.N.; Scott, C.C.; Clowes, G.H.A.
Chernaeva, O.O.: Med. zhur. 9: 1211-1227 (1939).
: Med. zhur. 10: 453-460 (1940).
Chevallier, A., Manuel, S. and Devoix, P.: Compt. rend. Acad. d. sc. 222: 824 (1946).
Chevrel-Bodin, M.L. and Cormier, M.: Compt. rend. Soc. de biol. 137: 760-762 (1946).
: Compt. rend. Soc. de biol. 138: 30 (1944).
Chiancone, F.M.: Arch. di Scienze biol. 27: 273-287 (1941).
Chiray, M., Justin-Besancon, L., Deirych, J. and Debray, C.A.: Compt. rend. Soc. de biol. 135: 284-288 (1941).
Chirico, M.: Atti d. r. Accad. naz. d. lincei. 1: 239-241 (1946).
Cholewa, J.: Ztschr. f. Krebsforsch. 41: 497-501 (1935).
Chornyak, J. See Sayers, R.R.
Christensen, E. and Holm, J.E.: Acta path. et microbiol. Scandinav. 54: 72-76 (1944).
Chu, J.P.: J. Endocrinology 2: 21-37 (1940).
Chu, J.P. and You, S.S.: J. Endocrinology 4: 115-124 (1945).
: J. Endocrinology 4: 431-435 (1946).
Clapp, D.R. See Morton, A.A.
Clark, B.B. See Loon, E.J.V.
Clarke, G.J. See Bischoff, F.
Clauberg, C., and Breipohl, W.: Klin. Wchnschr. 14: 119-121 (1935).
Claude, A.: Am. J. Cancer 31: 100-103 (1937).
Claus, P.E. See Guyer, M.F.
Clausen, M. See Lundberg, W.O.
Clayton, C.C. and Baumann, C.A.: Arch. Biochem. 5: 115-120 (1944).
Cleverdon, M.A.: See Benaglia, A.E.
Cleveland, R., Phelps, D. and Burch, J.C.: Endocrinology 28: 659-663 (1941).
Clisby, K.H. See Richter, C.P.
Clowes, G.H.A. and Chen, K.K.: Am. J. Cancer 27: 566 (1936).
Coates, H. See Segal, H.L.
Code, C.F. See Hay, L.J.
Cohen, J.B. See Browning, C.H.
Cohen, P.P.: Cancer Research 5: 626-630 (1945).
Cohen, P.P., Hekhuis, LeV. G., Sober, E.K.: Cancer Research 2: 405-410 (1942).
Collier, W.I. See Werner, A.A.
Collins, J.V., Gardner, W.U. and Strong, L.C.: Cancer Research 3: 29-35 (1943)
Collip, J.B. See Bachman, C.; McEuen, C.S.; Noble, R.L.; Selye, H.
Connal, K.I. See Bonser, G.M.
Connor, C.L.: Arch. Path. 30: 165-179 (1940).
Cook, J.W.: J. Chem. Soc. 2529-2532 (1931).
: J. Chem. Soc. 456-472 (1932a).
: Proc. Roy. Soc., London, s.B. 111: 485-496 (1932b).
: Cong. internat. de lucha cient. y Soc. contra el cancer, Madrid 2: 373-378 (1933a).
: J. Chem. Soc. 1592-1597 (1933b).
: J. Chem. Soc. 1412 (1934).
: Ergbn. d. Vitamin- u. Hormonforsch., Leipzig, pp. 213-258 (1939).
: Anales asoc. quim. Argentina 37: 5-33 (1949).
Cook, J.W. and de Worms, C.G.M.: J. Chem. Soc. 1825-1828 (1937).
Cook, J.W. and Haslewood, G.A.D.: J. Chem. Soc. 428-433 (1934).
Cook, J.W. and Hewett, C.L.: J. Chem. Soc. 398-405 (1933).
Cook, J.W., Hewett, C.L. and Hieger, I.: J. Chem. Soc. 395-405 (1933).
Cook, J.W., Hewett, C.L. Kennaway, E.L. and Kennaway, N.M.: Am. J. Cancer 40: 62-77 (1940a).
Cook, J.W. and Kennaway, E.L.: Am. J. Cancer 39: 381-428 (1940).
Cook, J.W., Kennaway, E.L. and Kennaway, N.M.: Nature 145: 627 (1940b).
Cook, J.W. and Martin, R.H.: J. Chem. Soc. 1125-1127 (1940).
Cook, J.W. and Robinson, A.M. (Mrs.): J. Chem. Soc. 303-304 (1940).
Cook, J.W. See Bachmann, W.E.; Badger, G.M.; Barry, G.; Burrows, H.
Coolen, M.L. See Maisin, J.
Cooper, K.E. See Browning, C.H.
Cooper, Z.K. and Reller, H.C.: J. Nat. Cancer Inst. 2: 335-344 (1942).
Cooper, Z.K., Firminger, H.I. and Reller, H.C.: Cancer Research 4: 617-621 (1944).

Cooper, Z.K. *See* Eckert, C.T.; Taussig, J.
Corbellini, A. *See* Roudoni, P.
Cordeiro, J.G.: Thesis Publ. med. exper. Chile 17: 1-23 (1942).
Cornier, M. *See* Chevrel-Rodin, M.L.
Cornil, L., Paillas, J.E., and Casteuil, E.R.: Bull. Assoc. franç. p. l'étude du cancer 27: 579-585 (1938).
Cornillot, M. *See* Lambret, O.
Corper, H.J.: J. Exper. Med. 21: 179-184 (1915).
Cortell, R.: Cancer Research 7: 158-161 (1947).
Corwin, W.C. *See* Ansbacher, S.; Rake, G.
Costa, R.M.: Dept. of Exper. Med. Chile 4: 1-30 (1940).
Cottet, J. *See* Loeper, M.
Cottini, G.P., and Mazzoni, G.P.: Am. J. Cancer 37: 186-195 (1939).
Coupain, J. *See* Gimeste, P.J.
Courrier, R. and Bennetz, M.: Compt. rend. Soc. de biol. 135: 825-827 (1941).
Cowdry, E.V.: Biol. Symposia. 10: 131-162 (1943).
Cowdry, E.V. and Paletta, F.X.: Am. J. Path. 17: 335-358 (1941a).
: J. Nat. Cancer Inst. 1: 745-759 (1941b).
Cowdry, E.V. and Suntzeff, V.: Yale J. Biol. and Med. 17: 47-58 (1944).
Cowdry, E.V. *See* Biesele, J.J.; Paletta, F.X.; Suntzeff, V.; Tatum, E.L.
Cowen, P.N.: Brit. J. Cancer 1: 401-405 (1947).
Cox, A.J., Jr. *See* Ambrose, A.M.; Wilson, T.H.
Crabtree, H.G.: J. Path. & Bact. 51: 299-302 (1940a).
: J. Path. & Bact. 51: 303-309 (1940b).
: Cancer Research 1: 34-38 (1941a).
: Cancer Research 1: 39-43 (1941b).
: Cancer Research 4: 688-693 (1944).
: Cancer Research 5: 346-351 (1945).
: Cancer Research 6: 553-559 (1946).
Cracium, E.C., Zugravescu, I., and Stefu, L.: Acta Union internat. contre cancer 4: 675-678 (1939).
Cracium, E.C., Zugravescu, I., Ursu, A. and Manolescu-Motoc, F.: Bull. Acad. de Roumanie, sec. sc. 23: 36-47 (1940-41).
Crafts, R.C. *See* Engle, E.T.
Craig, F.N., Bassett, A.M. and Salter, W.T.: Cancer Research 1: 869-879 (1941).
Cramer, W. and Horning, E.S.: Lancet, 230: 247-249 (1936).
Cramer, W., and Horning, E.S.: J. Path. & Bact. 44: 633-642 (1937).
Cramer, W. and Simpson, W.L.: Cancer Research 4: 601-616 (1944).
Cramer, W. and Stowell, R.E.: Cancer Research 1: 849-852 (1941).
: J. Nat. Cancer Inst. 2: 369-375 (1942a).
: J. Nat. Cancer Inst. 2: 379-402 (1942b).
: Cancer Research 3: 36-42 (1943a).
: Cancer Research 3: 668-681 (1943b).
Cramer, W. *See* Simpson, W.L.; Stowell, R.E.
Creech, H.J.: J. Am. Chem. Soc. 63: 576-578 (1941).
Creech, H.J. and Franks, W.R.: Am. J. Cancer 30: 555-562 (1937).
Creech, H.J. *See* Franks, W.R.
Crispolti, E.: Riv. ital. di ginec. 19: 567-577 (1936).
: Atti Soc. ital. di ostet. e ginec. 34: 272-275 (1938).
Crossen, R.J. and Loeb, L.: Arch. Path. 37: 202-212 (1944).
Crowfoot, D. *See* Chalmers, J.G.
Csato, T., Wetzler- Ligeti, C., and Wiesner, B.P.: Am. J. Cancer 36: 257-261 (1939).
Curtis, M.R. *See* Bullock, F.D.; Dunning, W.F.
Custo, E.L.: Clin. ostet. 42: 201-206 (1940).
Cuthbertson, D.P. *See* Bell, G.H.
Cutuly, E.: Proc. Soc. Exper. Biol. & Med. 45: 659-660 (1940).
Cuvelier, E. *See* Maisin, J.

D

Daels, F.: Compt. rend. cong. du cancer, Strasbourg 54-55 (1923).
: Brit. J. Radiol. 30: 474-476 (1925).
: Bull. Assoc. franç. p. l'étude du cancer 15: 102-109 (1926).
: Strahlentherapie 25: 675-678 (1927).
: Arch. f. klin. Chir. 177: 144-145 (1933).
Daels, F. and Raeten, G.: Bull. Assoc. franç. p. l'étude du cancer 15: 162-173 (1926).
Daels, F. and Riltris, R.: Bull. Assoc. franç. p. l'étude du cancer 16: 772-776 (1927).
: Bull. Assoc. franç. p. l'étude du cancer 20: 32-77 (1931).
: Bull. Assoc. franç. p. l'étude du cancer 26: 587-601 (1937).
Daft, F.S., Ashburn, L.L and Sebrell, W.H.: Science 96: 321-322 (1942b).
Daft, F.S., Ashburn, L.L., Spicer, S.S. and Sebrell, W.H.: Pub. Health Rep. 57: 217-218 (1942a).

Daft, F.S. *See* Ashburn, L.L.; Endicott, K.M.; Kornberg, A.; Spicer, S.S.
D'Agata, A.: Boll. Soc. ital. biol. sper. 17: 622-623 (1940).
Dall'Armi, G. *See* Natucci, G.
Dalton, A.J., Morris, H.P. and Dubnik, C.S.: J. Nat. Cancer Inst. 5: 451-454 (1945).
Dalton, A.J. *See* Edwards, J.E.; Morris, H.P.
D'Amour, F.E. *See* Castellano, S.A.; Smith, D.L.; Spencer, J.
Danner, M.: Klin, Wchnschr. 17: 658-660 (1938).
Dansi, A.: Ricera Sc. 92: 470 (1938).
Dansi, A., Morelli, E., and Reggiani, M.: Arch. ital. di med. sper. 2: 193-221 (1938).
Dansi, A., Morelli, E. and Sempronj, A.: Tumori 14: 273-286 (1940)
Dansi, A. and Salironi, E.: Ricera Sc. 13: 489 (1942).
Dansi, A., Sempronj, A., and Russo, M.: Boll. lega ital. contro cancro 10: 57-77 (1936).
Dansi, A. *See* Bachmann, W.E.; Morelli, E.
Dapra, L., and Silvani, A.G.: Med. Contemp. (Torino) 6: 256-260 (1940).
Daruysz, S. *See* Lacassagne, A.
Dascomb, H.E. *See* Syverton, J.T.
Daudel, R. *See* Lacassagne, A.
Davenport, H.A., Savage, J.L., Durstine, M.J. and Queen, F.B.: Cancer Research 1: 821-824 (1941).
Davidson, J.A. *See* Sykes, J.F.
Davis, J.E.: Am. J. Physiol. 134: 219-224 (1941).
Davis, J.H., Murphy, K.M. and Emge, L.A.: Am. J. Path. 17: 93-101 (1941).
Davis, L.T.: *See* Latta, J.S.
Day, H.G. and Follis, E.H., Jr.: Endocrinology 28: 83-93 (1941).
Deanesly, R.: J. Endocrinol. 1: 36-48 (1939a).
: J. Endocrinol. 1: 300-306 (1939b).
Deanesly, R. and Parkes, A.S.: J. Endocrinol. 2: 487-495 (1941).
Debray, C. *See* Chiray, M.
DeEds, F. *See* Wilson, R.H.; Ambrose, A.M.; McNaught, J.B.
De Gaetani, G.F.: Med. sper. Arch. ital. 9: 753-804 (1941).
De Gaetani, G.F. and Balli, V.: Pathologica 34: 293-302 (1942a).
: Pathologica 34: 359-365 (1942b).
De Gaetani, G. and Lanza, G.: Arch. ital. di med. sper. 1: 21-52 (1937a).
: Boll. Soc. med.-chir., Catania, 5: 354-465 (1937b).
De Gennaro, A. and di Grazia, A.: Haematologica, 18: 707-726 (1937).
De Gough, S.E. *See* Laqueur, E.
Deichmann, W.B., Hirose, R. and Witherup, S.: J. Indust. Hyg. & Toxicol. 27: 263-268 (1945).
Deichmann, W. and Kitzmiller, K.V.: J. Indust. Hyg. and Toxicol. 22: 484-487 (1940).
Deichmann, W.B., Kitzmiller, K.V., Dierker, M. and Witherup, S.: J. Indust. Hyg. & Toxicol. 29: 1-13 (1947).
Deichmann, W.B., Kitzmiller, K.V. and Spiegel, F.: J. Indust. Hyg. and Toxicol. 22: 488-491 (1940).
Deichmann, W.B., Machle, W., Kitzmiller, K.V. and Thomas, G.: J. Pharmacol. & Exper. Therap. 76: 104-117 (1942).
de Haas, A.M.L.: Nederl. tijdschr. v. geneesk., 83: 4395-4403.
de Jongh, S.E., and Kok, D.J.: Acta brev. Neerland. 5: 177-178 (1935).
: Acta brev. Neerland. 6: 46 (1936).
de Jonghe, A. *See* Maisin, J.
Del Castillo, E.B. and Calatroni, C.J.: Compt. rend. Soc. de biol. 104: 1024-1028 (1930).
Del Castillo, E.B. and Di Paola, G.: Endocrinology 30: 48-53 (1942).
Del Castillo, E.B., and Pinto, A.: Compt. rend. Soc. de biol. 129: 868-870 (1938).
Del Castillo, E.B. and Sammartino, R.: Rev. Soc. argent. de biol. 13: 455-475 (1937).
: Compt. rend. Soc. de biol. 129: 870-872 (1938).
Delfs, E. *See* Jones, G.E.S.
DeLuca, G. and Trojaniello, A.: Boll. Soc. ital. biol. sper. 22: 809-810 (1946).
Demay, M. *See* Tuchmann, H.
Demole, V.: Ztschr. f. Vitaminforsch. 8: 341-347 (1939).
Denisoff, N. *See* Pourbaix, Y.
Dennison, M. *See* Korenchevsky, V.
Derudder, A. *See* Chevallier, A.
DeSacy, G.S. *See* Letard, H.
Desmedt, P. *See* Maisin, J.
Dessau, F.: Arch. internat. de pharmacodyn. et de thérap., 55: 402-415 (1937).
: Arch. internat. de pharmacodyn. et de thérap. 58: 344-350 (1938).
Dessy, G.: Minerva med. 28 (2): 359-362 (1937).
: Minerva med. 29 (2): 394-398 (1938).
De Vita, J. *See* Gardner, W.U.: also Williams, W.L.
Devoix, P. *See* Chevallier, A.
DeWorms, C.G.M. *See* Bachmann, W.E.; Cook, J.W.
Dias, F. *See* Athias, M.

Dickens, F. and Weil-Malherbe, H.: Cancer Research 2: 560-566 (1942).
: Cancer Research 3: 73-87 (1943).
: Cancer Research 6: 161-170 (1946).
Dickens, F. See Weil-Malherbe, H.
Diddle, A.W. See Gardner, W.U.
Dieke, S.H.: Endocrinology 40: 123-136 (1947).
Dieke, S.H. and Richter, C.P.: Proc. Soc. Exper. Biol. & Med. 62: 22-25 (1946).
Dietrich, D.: Ztschr. f. Krebsforsch. 48: 187-203 (1938).
Dierker, M. See Deichman, W.B.
Dierych, J. See Chiray, M.
Di Grazia, A.: Gaz. internaz. med.-chir. 47: 580-583 (1937).
Di Grazia, A. See De Gennaro, A.
Dille, J.M. See Krems, A.D.
Dingemanse, E. and Tyslowitz, R.: Endocrinology 28: 450-457 (1941).
Dingemanse, E. See Laqueur, E.; Tyslowitz, R.
Di Paola, G.: Compt. rend. Acad. d. sc. URSS. 132: 517-518 (1939).
Di Paola, G. See Del Castillo, E.B.
Dittmar, K.: Ztschr. f. Krebsforsch 50: 20-26 (1940).
Doan, C.A. See Sabin, F.R.
Dobriner, K., Rhoads, C.P., and Lavin, G.I.: Proc. Soc. Exper. Biol. & Med. 41: 67-69 (1939).
: Cancer Research 2: 95-107 (1942).
Dobrovolskaia-Zavadskaia, N.: Compt. rend. Soc. de biol. 119: 83-85 (1935a).
: Compt. rend. Soc. de biol. 119: 360-363 (1935b).
: Compt. rend. Soc. de biol. 121: 1268-1271 (1936).
: Compt. rend. Soc. de biol. 129: 1055-1057 (1938).
: J. Genetics 40: 157-170 (1940).
: Compt. rend. Soc. de biol. 137: 689-691 (1943).
Dobrovolskaia-Zavadskaia, N. and Adamova, N.: Bull. Assoc. franç. p. l'étude du cancer 27: 308-341 (1938a).
: Bull. Assoc. franç. p. l'étude du cancer 28: 76-107 (1938b).
: Compt. rend. Soc. de biol. 139: 551-553 (1945).
Dobrovolskaia-Zavadskaia, N. and Rouyer, M.: Compt. rend. Soc. de biol. 127: 383-386 (1938).
Dobrovolskaia-Zavadskaia, N. and Simsilevich, F.: Libro do Oro, 293-301 (1935).
Dodds, E.C., Lawson, W. and Williams, P.C.: Nature 148: 142 (1941).
: Cancer Research 5: 485-486 (1945).
Dodds, E.C. See Burrows, H.
Doljanski, L. See Pikovski, M.
Domagk, G.: Ztschr. f. Krebsforsch. 44: 160-186 (1936).
: Medicine in Its Chemical Aspects. 3: 259-277 (1938).
Dominici, H. and Faure-Beaulieu, M.: Compt. rend. Acad. d. sc. 146: 1051-1054 (1908).
: Compt. rend. Soc. de biol. 1: 46-48 (1910).
Dominici, H., Laborde, S., and Laborde, A.: Compt. rend. Acad. d. sc. 156: 1107-1109 (1913).
Donahue, D.D. and Monaco, A.R.: Pub. Health Bull. 282: 30-38 (1944).
Donahue, D.D. See Von Oettingen, W.F.
Donato, V.M.: Semana méd. 48: 1239-1250 (1941).
Doniach, I. and Mottram, J.C.: Am. J. Cancer 39: 234-240 (1940).
Dos Ghali, J. See Bulliard, H.
Dosne, C.: Cancer Research 4: 512-514 (1944).
Dougherty, T.F. See Gardner, W.U.
Doxtader, E.K. See Wilson, R.H.
Draize, J.H., Woodward, G., Fitzhugh, O.G., Nelson, A.A., Smith, R.B., Jr. and Calvery, H.O.: Chem. Eng. News. 22: 1503-1504 (1944).
Draize, J.H. See Nelson, A.A.
Drew, J.E. See Vest, S.A.
Driessens, J.: Compt. rend. Soc. de biol. 140: 223-224 (1946).
Driessens, J. See Lambret, O.
Drill, V.A. and Loomis, T.A.: J. Pharmacol. & Exper. Therap. 90: 138-149 (1947).
Drill, V.A. and Pfeiffer, C.A.: Endocrinology 38: 300-307 (1946).
Drinker, K.R., Thompson, P.K., and Marsh, M.: Am. J. Physiol. 80: 31-64 (1927).
Drinker, K.R. See Thompson, P.K.
Druckrey, H.: Ztschr. f. Krebsforsch. 50: 27-29 (1940).
: Klin. Wchnschr. 22: 532-534 (1943).
Druckrey, H., Hamperl, H., Herken, H., and Rarei, R.: Ztschr. f. Krebsforsch. 48: 451-467 (1939).
Druckrey, H., Richter, R. and Vierthaler, R.: Naturwissenschaften 29: 63-64 (1941).
Druckrey, H. See Brock, N.
Dubnik, C.S. See Dalton, A.J.; Morris, H.P.
Dubois, J.: Compt. rend. Soc. de biol. 138: 149-151 (1944).
Dunlap, C.E., Aub, J.C., Evans, R.D. and Harris, R.S.: Am. J. Path. 20: 1-21 (1944).
Dunlap, C.E. and Warren, S.: Cancer Research 1: 730-731 (1941a).
: Cancer Research 1: 953-954 (1941b).

: Cancer Research 3: 606-607 (1943).
: Cancer Research 6: 454-465 (1946).
Dunlap, C.E. See Warren, S.
Dunn, R.C. See Svirbely, J.C.
Dunn, T.B. See Morris, H.P.; Andervont, H.B.
Dunning, W.F. and Curtis, M.R.: Am. J. Cancer 38: 516-532 (1940).
Dunning, W.F., Curtis, M.R., and Bullock, F.D.: Am. J. Cancer 28: 681-712 (1936).
Dunning, W.F., Curtis, M.R. and Eisen, M.J.: Am. J. Cancer 40: 85-127 (1940b).
Dunning, W.F., Curtis, M.R. and Madsen, M.E.: Cancer Research 7: 134-140 (1947b).
Dunning, W.F., Curtis, M.R. and Segaloff, A.: Cancer Research 6: 256-262 (1947a).
Dunning, W.F., Curtis, M.R. and Wood, F.C.: Am. J. Cancer 39: 80-93 (1940a).
Dunning, W.F. See Bullock, F.D.
Durand, E.A. See Collins, V.J.
Duran-Reynals, F.: Yale J. Biol. & Med. 11: 613-617 (1939).
Duran-Reynals, F., Shrigley, E.W. and de Hostos, E.: Cancer Research 5: 11-17 (1945).
Durant, A.: Rev. belge sc. med. 9: 258-265 (1937).
du Vigneaud, V., Spangler, J.M., Burk, D., Kensler, C.J., Sugiura, K., and Rhoads, C.P.: Science 95: 174-176 (1942).
du Vigneaud, V. See Burk, D.
Durstine, M.J. See Davenport, H.A.
Dyadyusha, G.F.: J. de méd. Ukraine 7: 131-144 (1937).

E

Earle, D.P., Jr. See Post, J.
Eberlin, S.L. See Ables, J.C.
Ebert, M.H.: Arch Dermat. & Symph. 158, 365-377(1929).
Eckert, C.T., Cooper, Z.K. and Seelig, M.G.: Arch. Path. 19: 83-90 (1935).
Eckhardt, H.J.: Ber. d. deutschen chem. Gesellsch. 73: 15-18 (1940).
Edwards, J.E.: J. Nat. Cancer Inst. 2: 197-199 (1941).
Edwards, J.E., and Dalton, A.J.: J. Nat. Cancer Insti. 3: 19-41 (1942).
Edwards, J.E., Heston, W.E. and Dalton, A.J.: J. Nat. Cancer Inst. 3: 297-301 (1942).
Edwards, J.E., and White, J.: Cancer Research 1: 746 (1941a).
: J. Nat. Cancer Inst. 2: 157-183 (1941b).
Edwards, J.E. See Andervont, H.B.; White, J.
Effkemann, G. See Herold, L.
Egaña, E., Szabo, I. and Lecannelier, S.: Rev. chilena de hig. y med. prev. 4: 39-49 (1941).
Egaña, E. See Lipschütz, A.
Eggers, H.E. See Lauridsen, J.
Eingorn, G.L. See Peisakhovich. I.M.
Eisen, M.J.: Cancer Research 2: 632-644 (1942).
: Proc. Soc. Exper. Biol. & Med. 49: 625-629 (1942a).
: Cancer Research 2: 632-644 (1942b).
: Cancer Research 6: 421-425 (1946).
Eisen, M.J. See Dunning, W.F.
Eker, R.: Acta. path. et microbiol. Scandinav. 22: 1-32 (1945).
: Acta. path. et microbiol. Scandinav. 24: 96-108 (1947).
Ekman, B. and Strombeck, J.P.: Acta. physiol. Scandinav. 14: 43-49 (1947).
Ellingsworth, S. See Browning, C.H.
Elliott, M.D. See Howe, P.R.
Ellis, F.W., Carr, C.J., Wiegand, E.J. and Krantz, J.C., Jr.: Proc. Soc. Exper. Biol. & Med. 52: 260-261 (1943).
Ellis, F.W. and Krantz, J.C., Jr.: J. Biol. Chem. 141: 147-154 (1941).
Ellis, F.W. See Gruber, C.M.
Elqueta-Elqueta, H.: Rev. chilena. de hig. y med. prev. 6: 259-291 (1942).
Elson, L.A. and Harris, R.J.C.: Brit. J. Cancer. 1: 327-334 (1947).
Elson, L.A. and Warren, F.L.: Brit. J. Cancer. 1: 86-97 (1947).
Eltsina, N.V.: Am. Rev. Soviet Med. 2: 500 (1945).
Elvehjem, C.A. See McIntire, J.M.; Teply, L.J.
Ely, J.O. and Phillips, R.L.: Endocrinology 27: 661-663 (1940).
Emde, H. See Michael, F.
Emery, F.E.: J. Endocrinol. 3: 254-259 (1943).
Emery, F.E. See Mathews, C.S.; Page, R.C.; Russell, H.K.
Emge, L.A.: Surg. Obst. & Gynec. 68: 472-480 (1939).
Emge, L.A. See Davis, J.H.; Murphy, K.M.
Emmart, E.W.: J. Nat. Cancer Inst. 1: 255-272 (1940).
Emmel, V.M. See Pfeiffer, C.A.
Emmens, C.W.: J. Endocrinol. 1: 142-146 (1939a).
: J. Physiol. 95: 379-392 (1939b).
Emmett, A.D., Hartzler, E.R. and Brown, R.A.: J. Pharmacol. & Exper. Therap. 78: 215-221 (1943).

Endicott, K.M., Kornberg, A. and Daft, F.S.: Pub. Health Rep. 59: 49-54 (1944).
Endicott, K.M. *See* Ashburn, L.L.; Kornberg, A.
Engel, P.: Arch. internat. de Pharm. et de thérap. 65: 101-110 (1941).
Engelbreth-Holm, J.: Cancer Research 1: 109-112 (1941).
Engelbreth-Holm, J. and Lefevre, H.: Ugesk. f. laeger. 103 (7): 208-214 (1941a).
: Cancer Research 1: 102-8 (1941b).
Engelbreth-Holm, J. and Poulsen, O.: Acta. Path. et microbiol. Scandinav. 21: 472-479 (1944).
Engelbreth-Holm, J. and Rask-Neilsen, R.: Cancer Research 7: 129-133 (1947).
Engelbreth-Holm, J. *See* Stamer, S.
Engelhart, E. *See* Rarei, B.
Enger, R.: Ztschr. f. d. ges. exper. Med. 108: 300-316 (1940).
Enger, R. and Göbel, H.: Ztschr. f. d. ges. exper. Med. 108: 99-111 (1940).
Enger, R. and Lampas, H.: Arch. f. exper. path. u. pharmakol. 196: 171-200 (1940).
Engle, E.T. and Aranow, H., Jr.: Endocrinology 38: 325-330 (1946).
Engle, E.T., and Crafts, R.C.: Proc. Soc. Exper. Biol. & Med. 42: 293-296 (1939).
Engle, E.T., Krakower, C. and Haagensen: Cancer Research 3: 859-866 (1943).
Engle, E.T. and Smith, P.E.: Am. J. Anat. 63: 349-365 (1938).
Engle, E.T. *See* Aranow, H., Jr.
Ennor, A.H.: Australian J. Exper. Biol. & Med. Sc. 20: 73-80 (1942)
Eschenbrenner, A.B.: J. Nat. Cancer Inst. 4: 385-388 (1944).
Eschenbrenner, A.B. and Miller, E.: J. Nat. Cancer Inst. 5: 251-255 (1945).
: J. Nat. Cancer Inst. 6: 325-341 (1946).
Eschenbrenner, A.B. *See* White, F.R.
Eskridge, L.C. *See* Hueper, W.C.
Esmarch, O.: Acta. path. et microbiol. Scandinav. 17: 9-21 (1940).
: Det. kgl. Danske. vid. Sel. Biol. Med. 16: 1-90 (1941).
: Acta. path. et microbiol. Scandinav. 19: 79-97 (1942).
Evans, H.M. and Lepkovsky, S.: J. Biol. Chem. 96: 179-188 (1932).
Evans, H.M., Simpson, M.E. and Li, C.H.: Endocrinology 33: 237-238 (1943).
Evans, H.M. *See* Becks, H.; Dunlap, C.E.; Koneff, A.A.; Simpson, M.E.

F

Fabiani, J. *See* Poumeau-Delille, G.
Fahim, H.A. *See* Robson, J.M.
Fairhall, L.T., Jenrette, W.V., Jones, S.W. and Pritchard, E.A.: Pub. Health Rep. 58: 607-617 (1943).
Fairhall, L.T. and Miller, J.W.: Pub. Health Rep. 56: 1610-1625 (1941a).
: Pub. Health Rep. 56: 1641-1650 (1941b).
Falin, L.I.: Am. J. Cancer 38: 199-211 (1940).
: Bull. Exper. Biol. & Med. 14: 90-92 (1942).
Falin, L.I. and Anissimova, V.V.: Bull. biol. et méd. expér. URSS 9: 518-520 (1940a).
: Ztschr. f. Krebsforsch. 50: 339-351 (1940b).
: Arch. de sc. biol., Moscow 60: 93-9 (1940c).
Falin, L.I. and Gromzewa, K.E.: Am. J. Cancer 36: 233-236 (1939).
: Arch. d. sc. biol., Moscow, 56 (3): 101-111 (1939).
: Arch. de sc. biol., Moscow 60: 86-92 (1940a).
: Virchow's Arch. f. path. anat. 306: 578-588 (1940b).
Fardon, J.C., Brotzge, G.C. and Loeffler, M.K.: Studies Inst. Divi Thomae 3: 53-60 (1941).
Farson, de C.B. *See* Krantz, J.C.
Fatyol, C.: Ztschr. f. Geburtsh. u. Gynäk., 119: 294-303 (1939).
Faure-Beaulieu, M. *See* Dominici, H.
Fedatov, D.M.: Compt. rend. Acad. d. sc. de l'URSS 31: 87-90 (1941).
Fels, S.S. *See* Shay, H.
Felson, H. *See* Schiff, L.
Ferguson, R.L. *See* Haymaker, W.
Fernholz, M.E. *See* Lettré, H.
Ferraro, A., Jervis, G.A. and Flicker, D.J.: Arch. path. 32: 723-738 (1941).
Ferrebee, J.W. *See* Carnes, W.H.; Kuhlmann, D.
Ferrill, H.W. *See* Low, F.N.
Fessler, A.: Dermat. Ztschr. 78: 329-337 (1938).
Field, J.B., Baumann, C.A. and Link, K.P.: Cancer Research 4: 768-771 (1944).
Fierz, H.E. *See* Jadassohn, W.

Fieser, L.F.: The Chemistry of Natural Products Related to Phenanthrene. 2nd Ed. New York (1937).
: Am. J. Cancer 34: 37-124 (1938).
Fieser, L.F. and Campbell, W.P.: J. Am. Chem. Soc. 60: 1142-1145 (1938).
Fieser, L.F. and Clapp, R.C.: J. Am. Chem. Soc. 63: 319-323 (1941).
Fieser, L.F. and Fieser, M.: Natural Products Related to Phenanthrene 3rd Ed. New York (1949).
Fieser, L.F., Fieser, M., Hershberg, E.B., Newman, M.S., Seligman, A.M., and Shear, M.J.: Am. J. Cancer, 29: 260-268 (1937a).
Fieser, L.F. and Hershberg, E.B.: J. Am. Chem. Soc., 57: 1681-1683 (1935).
: J. Am. Chem. Soc. 59: 394-398 (1937a).
: J. Am. Chem. Soc. 59: 2502-2509 (1937b).
: J. Am. Chem. Soc. 60: 1658 (1938a).
: J. Am. Chem. Soc. 60: 2542-2548 (1938b).
: J. Am. Chem. Soc. 61: 1565-1574 (1939).
: J. Am. Chem. Soc. 63: 251-254 (1941).
Fieser, L.F., Hershberg, E.B., Long, L. Jr. and Newman, M.S.: J. Am. Chem. Soc. 59: 475-478 (1937b).
Fieser, L.F. and Heymann, H.: J. Am. Chem. Soc. 63: 2333-2340 (1941).
Fieser, L.F. and Newman, M.S.: J. Am. Chem. Soc. 58: 2376-2382 (1936).
Fieser, L.F. and Seligman, A.M.: J. Am. Chem. Soc. 57: 942-946 (1935).
: J. Am. Chem. Soc. 60: 170-176 (1938).
Fieser, L.F. and Snow, D.K.: J. Am. Chem. Soc., 60: 176-177 (1938).
Fieser, L.F. *See* Cason, J.; and Hershberg, E.B.
Fieser, M. *See* Fieser, L.F.
Figelist, R.T.: Publ. med. exper. Chile 7: 1-25 (1941).
Figge, H.J.: Cancer Research 7: 721 (1947).
Figge. H.J. *See* Strong, L.C.
Finkel, M. *See* Lisco, H.
Finks, A.J. *See* Johns, C.O.
Finner, L.L. and Calvery, H.O.: Arch. Path. 27: 433-446 (1939).
Firminger, H. *See* Cooper, Z.K.
Fischer, B.: München. med. Wchnschr. 53: 2041-2047 (1906).
Fischer, W.H. *See* Miescher, K.
Fishmann, M., Shear, M.J., Friedman, H.F. and Stewart, H.L.: J. Nat. Cancer Inst. 2: 361-367 (1942).
Fishmann, W.H. *See* Morehead, R.P.
Fitzhugh, O.G., Knudsen, L.F. and Nelson, A.A.: J. Pharmacol. & Exper. Therap. 86: 37-48 (1946).
Fitzhugh, O.G. and Nelson, A.A.: J. Indust. Hyg. & Toxicol. 28: 40-43 (1946a).
: Proc. Soc. Exper. Biol. and Med. 61: 195 (1946b).
: J. Pharm. & Exper. Therap. 89: 18-30 (1947a).
: Proc. Soc. Exper. Biol. Med. 64: 305-310 (1947b).
Fitzhugh, O.G., Nelson, A.A. and Bliss, C.I.: J. Pharm. 80: 289-299 (1944).
Fitzhugh, O.G., Nelson, A.A. and Calvery, H.O.: J. Pharmacol. & Exper. Therap. 35: 207-221 (1945).
Fitzhugh, O.G. *See* Draize, J.H.; Nelson, A.A.
Flaks, J.: J. Endocrinology 4: 259-262 (1947).
Flaks, J. and Ber, A.: Bull. Assoc. franç. p. l'étude du cancer, 28: 108-116 (1938a).
: Compt. rend. Soc. de biol. 128: 506-509 (1938b).
: 3rd Internat. Cancer Cong., 160 (1939).
Fleming, R.B.L., Miller, J.W. and Swayne, V.R. Jr.: J. Indust. Hyg. & Toxicol. 24: 154-158 (1942).
Flicker, D.J. *See* Ferraro, A.
Flinn, F.B. and Geary, J.M.: Contrib., Boyce Thompson Inst. 11: 241-247 (1940).
Flushmann, C.F. *See* Laqueur, G.L.
Folley, S.J.: Proc. Roy. Soc. London, s.B. 132: 142-163 (1944).
Folley, S.J., Guthkelch, A.N., and Zuckerman, S.: Proc. Roy. Soc., London, s.B., 126: 469-491 (1939).
Folley, S.J. *See* Bottomley, A.C.; Van Wagenen, G.
Follis, R.H. Jr. *See* Day, H.G.
Foote, E.C. *See* Jones, G.E.S.
Forbes, J.C.: J. Pharmacol. & Exper. Therap. 65: 287-293 (1939).
Forbes, J.C., Leach, B.E. and Williams, G.Z.: Proc. Soc. Exper. Biol. & Med. 52: 47-48 (1942).
Forbes, J.C. *See* May, L.G.
Forbes, T.R.: Endocrinology 29: 70-76 (1941).
: Endocrinology 30: 761-764 (1942).
Forkner, C.E. *See* Sabin, F.R.
Foster, C.L.: J. Endocrinol. 3: 79-86 (1942).
Foster, E.G. *See* Baumann, C.A.
Foster, R.H.K. and Jenkins, L.: Arch. Path. 37: 279-281 (1944).
Foulds, L.: Am. J. Cancer 31: 404-413 (1937).
: Am. J. Cancer 35: 363-373 (1939).
: Brit. J. Cancer 1: 172-176 (1947).
Foulds, L. *See* Gye, W.E.
Fox, R.P. *See* Kochakian, C.D.
Franciosi, A.: Boll. Soc. ital. biol. sper. 17: 701-702 (1942).

Fränkel, E. and Klein, W.: Ztschr. f. Krebsforsch. 15: 76-84 (1916).
Franks, W.R. and Creech, H.J.: Am. J. Cancer 35: 203-212 (1939).
Franks, W.R. *See* Creech, H.J.; Hall, G.E.
Franseen, C.C., Aub, J.C. and Simpson, C.L.: Cancer Research 1: 393-396 (1941a).
: Cancer Research 1: 489-493 (1941b).
Frazier, C.N., and Mu, J.W.: Proc. Soc. Exper. Biol. & Med. 32: 997-1001 (1935).
Freed, S.C., Rosenbaum, E.E. and Soskin, S.: J.A.M.A. 115: 2264-2266 (1940).
Freed, S.C. *See* Rodard, S.
Freedman, G. *See* Gruber, C.M.
Freedman, H. *See* MacBride, C.M.
Freudenberger, C.B. and Clausen, F.W.: Anat. Rec., 68: 133-144 (1937).
Freyberg, R.H. *See* Block, W.D.
Fricke, A.: Diss., Marburg (1909).
Friedewald, W.F. and Rous, P.: J. Exper. Med. 80: 101-126 (1944a).
: J. Exper. Med. 80: 127-144 (1944b).
Friedewald, W.F. *See* Rous, P.
Friedrichs, A.F. *See* Harris, W.H.
Friedman, H.F. *See* Fishman.
Friedman, S. *See* Selye, H.
Friedrich-Freska, H.: Biol. Zentralbl. 60: 498-524 (1940).
Froniceirc, N. *See* Chahovitch, X.
Fuenzalida, F. *See* Lipschütz, A.
Fujiwara, T. *See* Nakahara, W.
Fulton, J.D. *See* Twort, C.C.
Furtado-Dias, M.T. *See* Athias, M.
Furth, J. and Barnes, W.A.: Cancer Research 1: 17-22 (1941).
Furth, J. and Boon, M.C.: Science 98: 138-139 (1943).
Furth, J. and Furth, O.B.: Am. J. Cancer 34: 169-183 (1938).
Furth, J. *See* Barnes, W.A.; McEndy, D.P.
Furth, O.B. *See* Furth, J.
Furukawa, R.: Acta. med. Nagasak. 1: 169-173 (1939a).
: Acta. med. Nagasak. 1: 174-175 (1939b).
: Acta. med. Nagasak. 1: 177-178 (1939c).
: Gann 33: 236-238 (1939d).
: Nagasaki Igakkwai Zassi 17: 2365-2369 (1939e).
: Nagasaki Igakkwai Zassi 17: 2385-2387 (1939f).
: Nagasaki Igakkwai Zassi 17: 2394-2395 (1939g).
Furukawa, R. *See* Tsubouti, G.

Gaarenstroom, J.H., and Levie, L.H.: J. Endocrinol. 1: 420-429 (1939).
Gal, E. *See* Havas, L.
Gallardo, J.B.S.: Rev. Soc. argent. de biol. 16: 118-128 (1940).
Gambino, A.: Rassegna d'obstet. e ginec. 49: 159-179 (1940).
Gandolfi, C. and Tanzi, B.: Boll. Soc. ital. de biol. sper. 16: 685-6 (1941).
Gandolfo Herrara, R. *See* Sammartino, R.
Gardner, W.U.: Anat. Rec. 68: 339-347 (1937a).
: Some Fundamental Aspects of the Cancer Problem. pp. 67-75. The Science Press, New York (1937b).
: Proc. Soc. Exper. Biol. & Med. 45: 230-232 (1940).
: Endocrinology 28: 53-61 (1941a).
: Cancer Research 1: 345-358 (1941b).
: J. Nat. Cancer Inst. 1: 502-504 (1941c).
: Cancer Research 3: 92-99 (1943).
Gardner, W.U. and Allen, E.: Yale J. Biol. & Med. 12: 213-234 (1939).
Gardner, W.U., Allen, E. and Smith, G.M.: Proc. Soc. Exper. Biol. and Med. 46: 511-513 (1941).
Gardner, W.U., Allen, E., Smith, G.M., and Strong, L.C.: J.A.M.A. 110: 1182-1183 (1938).
Gardner, W.U., Allen, E., and Strong, L.C.: Anat. Rec. 64: (Suppl.) 17-18 (1936a).
Gardner, W.U. and de Vita, J.: Yale J. Biol. & Med. 13: 213-215 (1940).
Gardner, W.U., Diddle, A.W., Allen, E., and Strong, L.C.: Anat. Rec. 60: 457-475 (1934).
Gardner, W.U. and Dougherty, T.F.: Yale J. Biol. and Med. 17: 75-90 (1944).
Gardner, W.U., Dougherty, T.F. and Williams, W.L.: Cancer Research 4: 73-87 (1944).
Gardner, W.U. and Hill, R.T.: Proc. Soc. Exper. Biol. & Med. 34: 718-720 (1936).
Gardner, W.U., Kirschbaum, A. and Strong, L.C.: Arch. Path. 29: 1-7 (1940).
Gardner, W.U. and Pfeiffer, C.A.: Proc. Soc. Exper. Biol. & Med. 37: 678-679 (1938).
Gardner, W.U., Smith, G.M., Allen, E. and Strong, L.C.: Arch. Path. 21: 265-272 (1936b).
Gardner, W.U., Smith, G.M., and Strong, L.C.: Proc. Soc. Exper. Biol. & Med. 33: 148-150 (1935).

Gardner, W.U., Smith, G.M., Strong, L.C. and Allen, E.: Arch. Path. 21: 504-508 (1936c).
: J.A.M.A. 107: 656-657 (1936d).
Gardner, W.U. and Strong, L.C.: Yale J. Biol. & Med. 12: 543-548 (1940).
Gardner, W.U., and Van Wagenen, G.: Endocrinology 22: 164-172 (1938).
Gardner, W.U. See Allen, E.; Gomez, E.T.; Hooker, C.W.; Kirschbaum, A.; Landauer, W.; Lawrence, J.H.; Pfeiffer, C.A.; Smith, P.K.; Strong, L.C.; Wentworth, J.H.; Williams, W.L.
Garschin, W.G.: Ztschr. f. Krebsforsch. 45: 62-73 (1937).
Garschin, W.G. and Schabad, L.M.: Ztschr. f. Krebsforsch. 43: 137-145 (1936).
Garufi, G.: Arch. di ostet. e ginec. 1: 189-221 (1937).
Gates, I. See Warren, S.
Geary, J.M. See Flin, F.B.
Gehlen, W. See Nothlin, E.
Geist, S.H., Walter, R.I. and Salmon, V.J.: Proc. Soc. Exper. Biol. & Med. 43: 712-718 (1940).
Geist, S.H. See Walter, R.I.
Geldres, G.: Publ. med. exper. Chile 11: 1-15 (1942).
Gérard, M.J.: Compt. rend. Soc. de biol. 111: 227-229 (1932).
Gershon-Cohen, J. See Shay, H.
Geschickter, C.F.: Science 89: 35-37 (1939a).
: Radiology 33: 439-448 (1939b).
Geschickter, C.F. and Byrnes, E.W.: Arch. Path. 33: 334-356 (1942).
Geschickter, C.F., Lewis, D., and Hartman, C.G.: Am. J. Cancer, 21: 828-859 (1934).
Geyer, A. See Sabrazès, J.
Ghiron, V.: Boll. e Atti d. Reale Accad. med. de Roma 63: 200-201 (1937).
: 3d Internat. Cancer Cong., p. 16 (1939).
Ghoneim, A. See Schönberg, A.
Giese, J.E., Miller, J.A. and Baumann, C.A.: Cancer Research 5: 337-340 (1945).
Gilchrist, M. See King, E.J.
Gilman, A. See Koelle, G.B.
Gilmour, M.D.: J. Path. & Bact. 45: 179-188 (1937).
Gineste, P.J., Coupain, J. and Derudder, A.: Compt. rend. Soc. de biol. 137: 518 (1943).
Ginzler, A.M. See Haymaker, W.
Ginzton, L.L. See Perry, I.H.
Giuffrida, F.: Ann. di ostet. e ginec. 11: 161-171 (1939).
Glass, S. See Marx, R.
Glücksmann, A.: Cancer Research 5: 385-400 (1945).
Glynn, L.E. See Himsworth, H.P.
Göbel, H. See Enger, R.
Godenir, A. See Maisin, J.
Goerner, A.: J. Biol. Chem. 122: 529-538 (1938).
Goerner, A. and Goerner, M.M.: Am. J. Cancer, 37: 518-520 (1939a).
: J. Biol. Chem. 128: 559-565 (1939b).
: J. Nutrition 18: 441-446 (1939c).
: Cancer Research 3: 833-838 (1943).
Goerner, M.M. See Goerner, A.
Goldblatt, H. See György, P.; Popper, H.
Goldschmidt, V.M. See King, E.J.
Goldsmith, E.D. See Keston, A.S.
Gomez, E.T. and Turner, C.W.: Proc. Soc. Exper. Biol. & Med. 39: 140-142 (1938).
: Am. J. Cancer, 37: 108-113 (1939).
Gomez, E.T., Turner, C.W., Gardner, W.U., and Hill, R.T.: Proc. Soc. Exper. Biol. & Med. 36: 287-290 (1937).
Gomez, E.T. See Turner, C.W.
Gonzales, G.: Thesis, Univ. of Chile (1943a).
: Publ. Med. exper. Chile 19: 1-23 (1943b).
Gonzalez, S. See Lipschütz, A.
Goormaghtigh, N.: Bull. Acad. roy. de med. de Belgique 9: 445-482 (1929a).
: Compt. rend. de l'Assoc. des anat. 24: 251-256 (1929b).
Goormaghtigh, N., and Amerlinck, A.: Compt. rend. Soc. de biol. 103: 527-529 (1930).
Gordon, A.S. See Keston, A.S.
Gordonoff, T. and Ludwig, F.: Ztschr. f. Krebsforsch. 47: 421-426 (1938).
Gorham, A.T. See Abels, J.C.
Gottlieb, G. See Taschner, E.
Gottschalk, R.G.: Proc. Soc. Exper. Biol. & Med. 50: 369-373 (1942).
Goulden, F. See Cook, J.W.
Grace, E.J. See Rosenthal, M.
Grady, H.G. and Stewart, H.L.: Am. J. Path. 16: 417-432 (1940a).
: Publ. Health Rep. 55: 169-170 (1940b).
Grady, H.G. See Andervont, H.B.; Shimkin, M.B.
Graff, A. See Hamperl, H.
Graham, R. See Sampson, J.R.
Grant, R.L., Calvery, H.O., Laug, E.P. and Morris, H.J.: J. Pharmacol. & Exper. Therap. 64: 446-457 (1938).
Grant, R.L. See Morris, H.P.
Green, E.U.: Cancer Research 2: 210-217 (1942).

Green, H.N.: Repts. Yorkshire Council, Brit. Emp. Cancer Camp. 1943, 8-9.
: Rep. Yorkshire Council, Brit. Emp. Cancer Camp. 1944
Green, H.N. *See* Bielschowsky, F.
Green, R.R. *See* Burrill, M.W.
Greenblatt, R.B. and Kupperman, H.S.: Amer. J. Obst. & Gynec. 54: 584-495 (1947).
Greenwood, R.: Arch. Neurol. & Psychiat. 45: 1048-1049 (1941).
Griesbach, W.E. *See* Purves, H.D.
Griffiths, M.: Proc. Linnaean Soc. N.S. Wales 67: 279-281 (1942).
Griffiths, M. and Young, F.G.: J. Endocrinol. 3: 96-106 (1942).
Grimmett, R.E.R., McIntosh, I.G., Wall, E.M. and Hopkirk, C.S.M.: New Zealand J. Agric. 54: 216-223 (1937).
Gromzewa, K.E. *See* Falin, L.I.
Groome, J.R.: Quart. J. Exper. Physiol. 29: 367-377 (1939).
Gross, P., Axelrod, A.E. and Bosse, M.D.: Am. J. M. Sc. 208: 642-660 (1944).
Gruber, C.M.; Ellis, F.W. and Freedman, G.: J. Pharmacol. 81: 254-268 (1944).
Grumbrecht, P.: Arch. f. Gynäk. 160: 525-531 (1936).
Grumbrecht, P. and Loeser, A.: Arch. f. exper. Path. u. Pharmakol. 193: 34-47 (1939).
: Arch. f. exper. Path. u. Pharmakol. 195: 445-459 (1940).
Gruner, J. *See* Bertrand, I.
Guercio, F.: Tumori 13: 412-463 (1939).
Guérin, M. *See* Oberling, C.; Roussy, G.; Sannié, C.
Guérin, P. *See* Oberling, C.; Roussy, G.; Sannié, C.
Gulbransen, R. *See* Browning, C.H.
Gummel, H. and Rarei, B.: Ztschr. f. Krebsforsch 48: 347-354 (1939).
Gummel, H. *See* Rarei, B.
Gustavson, R.G. *See* Spencer, J.
Guthkelch, A.N. *See* Folley, S.J.
Guyer, M.F. and Claus, P.E.: Cancer Research 2: 16-18 (1942).
Gye, W.E. and Foulds, L.: Am. J. Cancer 35: 108 (1939).
György, P., Poling, E.C. and Goldblatt, H.: Proc. Soc. Exper. Biol. and Med. 47: 41-44 (1941).
György, P., Tomarelli, R. Ostergard, R.P. and Brown, J.B.: J. Exper. Med. 76: 413-420 (1942).
György, P. *See* Popper, H.

Haag, H.B. and Ambrose, A.M.: J. Pharmacol. 59: 93-100 (1937).
Haag, H.B. *See* Weatherby, J.H.
Haagensen, C.D. and Krehbiel, O.F.: Am. J. Cancer 26: 368-377 (1936a).
: Am. J. Cancer 27: 474-484 (1936b).
Haagensen, C.D. and Randall, H.T.: Arch. Path. 33: 411-442 (1942).
Haagensen, C.D. *See* Engle, E.T.
Haddow, A.: Acta. Union internat. contre cancer 3: 342-353 (1938a).
: J. Path. & Bact. 47: 567-569 (1938b).
: J. Path. & Bact. 47: 581-591 (1938c).
Haddow, A., Harris, R.J.C., Kon, G.A.R., and Roe, E.M.: Philos. Tr. Roy. Soc. London, s.A. 241: 147-195 (1948).
Haddow, A. and Russell, H.: Am. J. Cancer 29: 363-366 (1937).
Haddow, A., Scott, C.M. and Scott, J.D.: Proc. Roy. Soc., London, s.B. 122: 477-507 (1937).
Haerem, A.T.: Proc. Soc. Exper. Biol. & Med. 45: 536-539 (1940).
: Cancer Research 1: 744 (1941).
Haga, I.: Ztschr. f. Krebsforsch. 12: 526-576 (1913).
Halberstaedter, L.: Harefuah, 14: 33-35 (1938).
: Ann. Fac. franç. de méd. et de pharm. de Beyrouth 8: 85-87 (1939a).
: Nature, London 144: 377-378 (1939b).
: Am. J. Cancer 38: 351-358 (1940).
Hale, H.B. and Weichert, C.K.: Proc. Soc. Exper. Biol. & Med. 55: 201-202 (1944).
Hall, C.E. *See* Selye, H.
Hall, E.M. *See* Reimann, S.P.
Hall, G.E. and Franks, W.R.: J. Biol. Chem. 123: xlix (1938).
Hall, K.: J. Path. & Bact. 51: 75-82 (1940).
Hall, K. *See* Korenchevsky, V.
Halter, R. *See* Abels, J.C.; Kensler, C.J.; Sugiura, K.
Hamaguchi, I. *See* Hamaguti, I.
Hamaguti, I. and Yosida, S.: Jap. J. M. Sc., Sect. VIII, Int. Med. Pediat., & Pysch. 4: 379-381 (1938a).
: Jap. J. M. Sc., Sect. VIII, Int. Med. Pediat. & Pysch. 5: 45-48 (1938b).
Hamaguti, I., Yosida, S. and Hozyo, S.: Jap. J. M. Sc., Sect. VIII, Int. Med., Pediat. & Psych. 5: 150-154 (1939).

Hamann, A. *See* Brunschwig, A.
Hamburger, C.: Acta. path. et microbiol. Scandinav. 54: 72-76 (1944a).
: Acta. path. et microbiol. Scandinav. 54: 209-240 (1944b).
Hamilton, J.B. *See* Wolfe, J.M.; Wilson, J.G.
Hamlin, M.T. *See* Scudi, J.V.
Hammel, M.A. *See* Von Haam, E.
Hammett, F.S.: Protoplasma 13: 331-347 (1931).
: Proc. Soc. Exper. Biol. & Med. 45: 601-602 (1940).
Hamperl, H.: Arch. f. exper. Path. u. Pharmakol. 190: 187-188 (1939).
: Klin. wchnschr. 20: 112 (1941).
: Klin. u. praxis. 1: 186-187 (1946).
Hamperl, H., Graffi, A. and Langer, E.: Ztschr. f. Krebsforsch. 53: 133-184 (1942).
Hamperl, H. *See* Arnold, O.; Brock, N.; Druckrey, H.
Hanzlik, P.J.: Arch. f. exper. path. u. pharmakol. 97: 183-201 (1923).
Hanzlik, P.J., Lawrence, W.S. and Laqueur, G.L.: J. Indust. Hyg. & Toxicol. 29: 233-241 (1947).
Hanzlik, P.J., Lehman, A.J., Van Winkle, W. Jr., and Kennedy, N.K.: J. Pharmacol. 67: 114-126 (1939b).
Hanzlik, P.J., Newman, H.W., Van Winkle, W. Jr., Lehman, A.J. and Kennedy, N.K.: J. Pharmacol. 67: 101-113 (1939a).
Hanzlik, P.J. and Presho, E.: J. Pharmacol. & Exper. Therap. 21: 123-129 (1923a).
: J. Pharmacol. & Exper. Therap. 21: 145-150 (1923b).
Hanzlik, P.J., Seidenfeld, M.A. and Johnson, C.C.: J. Pharmacol. 41: 387-406 (1930).
Hanzlik, P.J. *See* Seidenfeld, M.A.
Harada, M.: Osaka Igakkai Zasshi 35: 1916 (1936a).
: Osaka Igakkai Zasshi 35: 2295-2299 (1936b).
: Osaka Igakkai Zasshi 35: 955 (1937).
Harada, M. *See* Kinosita, R.
Harde, E.: 3rd Internat. Cancer Cong., 126 (1939).
Harding, H.E.: Ann. Rep. Brit. Emp. Cancer Camp. 116 (1947).
Harris, J.S. and Kohn, H.I.: J. Pharmacol. & Exper. Therap. 78: 56-63 (1943).
Harris, P.N., Anderson, H.C. and Chen, K.K.: J. Pharmacol. 75: 69-77 (1942a).
: J. Pharmacol. 75: 78-82 (1942b).
Harris, P.N. and Bradsher, C.K.: Cancer Research 6: 671-673 (1946).
Harris, P.N., Kradhl, M.E. and Cloves, G.H.A.: Cancer Research 7: 162-175 (1947a).
: Cancer Research 7: 176-177 (1947b).
Harris, P.N. *See* Chen, K.K.
Harris, R.J.C. *See* Haddow, A.; Elson, L.A.
Harris, R.S. *See* Dunlap, C.E.
Harris, W.H., and Friedrichs, A.V.: Proc. Soc. Exper. Biol. & Med. 29: 1047-1049 (1932).
Harrold, G.C. *See* McCord, C.P.
Harsh, R., Overholser, M.D. and Wells, L.J.: J. Endocrinol. 1: 261-267 (1939).
Hart, G.W. *See* Morrell, J.A.
Hartmann, C.G. and Speert, H.: Endocrinology 29: 639-648 (1941).
Hartmann, C.G. *See* Geschickter, C.F.
Hartwell, J.L. and Stewart, H.L.: J. Nat. Cancer Inst. 3: 277-285 (1942).
Hartzell, A.: Contrib., Boyce Thompson Inst. 11: 249-260 (1940).
: Contrib., Boyce Thompson Inst. 13: 501-513 (1945).
Hartzler, E.R. *See* Emmett, A.D.
Hashida, M.: Gann 35: 164-166 (1941).
Hashida, M. *See* Amano, S.
Hasimoto, T. *See* Nagao, N.; Masayama, T.
Haslewood, G.A.D. *See* Bachmann, W.E.; Barry, G.; Cook, J.W.
Hatschek, R. *See* Waldschmidt-Leitz, E.
Hausmann, R. *See* Waldschmidt-Leitz, E.
Havas, L. and Gal, E.: Nature, London 141: 284-285 (1938).
Haxthausen, H.: Hospitalstid. 59: 1018-1024 (1916).
Hayashi, I. and Tomita, T.: Gann 31: 232-238 (1937).
Haymaker, W., Ginzler, A.M. and Ferguson, R.L.: Am. J. M. Sc. 212: 431-432 (1946).
Heep, W.: Frankfurt, Ztschr. f. Path. 50: 48-62 (1936).
Heiman, J.: Am. J. Cancer, 33: 423-442 (1938).
: Cancer Research 2: 25-27 (1942).
: Cancer Research 4: 31-34 (1944).
: Cancer Research 5: 426-430 (1945).
Heiman, J. and Meisel, D.: Cancer Research 6; 617-619 (1946).
Heinlein, H.: Verhandl. d. deutsch. path. gesellsch. 93-96 (1936).
Hekhuis, Le V.G. *See* Cohen, P.P.
Hellbaum, A.A. *See* Turner, H.H.
Heller, C.G. and Jungck, E.C.: Proc. Soc. Exper. Biol. and Med. 65: 152-154 (1947).
Heller, V.G. and Burke, A.D.: J. Biol. Chem. 74: 85-93 (1927).

Hellmich, W.: Ztschr. f. Krebsforsch. 28: 44-46 (1928).
Hellner, H.: Beitr. z. klin. Chir. 168: 538-553 (1938).
: München. med. Wchnschr. 84: 980-984 (1937).
Helmholz, R.F.: Bull. Johns Hopkins Hosp. 18: 365-368 (1907a).
: Bull. Johns Hopkins Hosp. 18:369-370 (1907b).
Helpup, A.: Diss. Greifswald (1889).
Henderson, L.M. *See* McIntire, J.M.
Henshaw, P.S. and Mayer, H.L.: J. Nat. Cancer Inst. 4: 523-525 (1944).
Henshaw, P.S. *See* Nettleship, A.
Heppel, L.A.: Proc. Soc. Exper. Biol. & Med. 48: 72-74 (1941).
Heppel, L.A., Neal, P.A., Highman, B. and Porterfield, V.T.: J. Indust. Hyg. & Toxicol. 28: 1-8 (1946).
Heppel, L.A., Neal, P.A., Perrin, T.L., Orr., M.L., Porterfield, V.T.: J. Indust. Hyg. & Toxicol. 26: 8-16 (1944).
Herken, H. *See* Druckrey, H.
Herman, J.R. *See* Rothbard, S.
Herold, L. and Effkemann, G.: Arch. f. Gynäk. 163: 85-93 (1936a).
: Arch. f. Gynäk. 163: 94-101 (1936b).
: Zentralbl. f. Gynäk. 61: 1161-1164 (1937).
Herrmann, G.R.: Proc. Soc. Exper. Biol. & Med. 163: 436-438 (1946).
Hershberg, E.B. and Fieser, L.F.: J. Am. Chem. Soc. 63: 2561-2564 (1941).
Hershberg, E.B. *See* Fieser, L.F.
Hess, W.: Frankfurt. Ztschr. f. Path. 47: 522-533 (1935).
Hessel, G.: Biochem. Ztschr. 177: 146-155 (1926).
Hester, H.R. *See* Sampson, J.R.
Heston, W.E.: J. Nat. Cancer Inst. 1: 105-111 (1940).
: J. Nat. Cancer Inst. 2: 127-132 (1941).
Heston, W.E. *See* Edwards, J.E.; Larsen, C.D.; White, F.R
Heussner, C.E. *See* McCord, C.P.
Hewett, C.L. *See* Bachmann, W.E.; Barry, G.; Cook, J.W.
Heymann, H. *See* Fieser, L.F.
Hieger, I.: Biochem. J. 24: 505-511 (1930).
: Am. J. Cancer 28: 522-529 (1936).
Hieger, I. *See* Barry, G.; Burrows, H.; Cook, J.W.; Kennaway, E.L.
Highman, B. *See* Heppel, L.A.
Hildebrand, E.: Ztschr. f. d. ges. exper. Med. 105: 395-405 (1939).
: *See* Lauber, H.J.
Hill, R.M., Rutledge, E.K., Ware, A.G., Schultz, F.H. and Livingston, W.H.: Cancer Research 3: 841-848 (1943).
Hill, R.T. *See* Gardner, W.U.; Gomez, E.T.
Himsworth, H.P. and Glynn, L.E.: Clin. Sc. 4: 421-447 (1942).
Hirose, R.: *See* Deichman, W.B.
Hisaw, F.L. and Landrum, F.C.: Endocrinology 20: 228-229 (1936).
Hisaw, F.L. *See* Leonard, S.L.
Hoch-Ligetti, C.: Am. J. Cancer 39: 365-376 (1940).
: Brit. J. Exper. Path. 22: 233-240 (1941).
: Cancer Research 6: 563-573 (1946).
: Nature, London 159: 780 (1947a).
: Cancer Research 7: 148-157 (1947b).
: Brit. J. Cancer 1: 391-396 (1947c).
: *See* Burrows, H.
Hodge, H.C. *See* Segal.
Holch, H.G.O.: J.A.M.A. 109: 1517-1520 (1937).
Hollander, W.F. *See* Strong, L.C.
Holm, J.E. *See* Christensen, E.
Holtz, F. *See* Arnold, O.
Hooker, C.W.: Endocrinology 30: 77-84 (1942).
Hooker, C.W., Gardner, W.U. and Pfeiffer, C.A.: J.A.M.A. 115: 443-445 (1940).
Hooker, C.W. and Pfeiffer, C.A.: Cancer Research 2: 759-769 (1942).
Hopkins, F.H. *See* Bing, R.J.
Hopkirk, C.S.M. *See* Grimmett, R.E.R.
Horii, K. *See* Masayama, T.
Horning, E.S., and Mochowski, L.D.: Brit. J. Cancer 1: 59-63 (1947).
Hosino, I.: Zikken Syokk. Ryogk. 15: 5-49 (1940a) Abst. in Jap. J. Med. Sci. II.
: Biochem. 4: 104 (abstracts) (1941).
: Zikken. Syokk. Ryogk. 15: 117-151 (1940b) Abst. in Jap. J. Med. Sci. II.
Houssay, B.A., Martinez, C. and Cardeza, A.F.: Rev. Soc. Argent 23: 288-293 (1947).
Howe, P.R., Elliott, M.D. and Shear, M.J.: Am. J. Path. 16: 295-300 (1940).
Hozyo, S. *See* Hamaguti, I.
Hueck, W. *See* Wacker, L.
Hueper, W.C.: Arch. Path. 28: 510-531 (1939).
: Arch. Path. 31: 11-24 (1941).
: Cancer Research 2: 551-9 (1942a).
: Arch. Path. 33: 1-17 (1942b).
: Arch. Path 35: 846-856 (1943).
: Cancer Research 5: 331-336 (1945).
Hueper, W.C., Briggs, F.A., and Wolfe, H.D.: J. Indust. Hyg. & Toxicol. 20: 85-91 (1938a).

Hueper, W.C., Landsberg, J.W.: Arch. Path. 29: 633-645 (1940).
Hueper, W.C., Landsberg, J.W. and Eskridge, L.C.: J. Pharmacol. & Exper. Therap. 70: 201-210 (1940).
Hueper, W.C., Wiley, F.H. and Wolfe, H.D.: J. Indust. Hyg. & Toxicol. 20: 46-84 (1938b).
Hueper, W.C. and Wolfe, H.D.: Am. J. Path. 13: 656 (1937).
Hueper, W.C. *See* Ichniowski, C.T.; Wiley, F.H.
Huf, E.: Klin. Wchnschr. 19: 915-917 (1940).
Huffman, J.W.: Endocrinology 29: 77-79 (1941).
Hughes, A.M.: Endocrinology 34: 69-76 (1944).
Hughes, G.E. *See* Hughes, H.
Hughes, H. and Hughes, G.E.: Brit. J. Exper. Path. 25: 126-130 (1944).
Hughes, H.B. *See* Schmidt, L.H.
Huguenin, R.: Arch. med. exper. d'anat. path. 22: 422-432 (1910).
Huguenin, R., Nemours-Auguste, and Albot, G.: Compt. rend. Soc. de biol. 108: 879-881 (1931).
: Ann. d'anat. path. 9: 263-279 (1932).
Hume, E.M., Burbank, R., and Korenchevsky, V.: J. Path. & Bact. 49: 291-298 (1939).
Hüter, F.: Ztschr. f. Naturforschung. 26: 19-25 (1947).
Hval, E.: Om 1:2:5:6-Dibenzanthracensarkomens Utvikling. Klaus Hanssens Fond. No. 14, 141 pp. Bergen (1937).

I

Ichniowski, C.T. and Hueper, W.C.: J. Am. Pharm. A. 35: 225-230 (1946).
Iglesias, R.: Publ. Med. Exper. (Chile), 1-32 (1938).
Iglesias, R., Lipschütz, A. and Nieto, G.: Rev. de med. y aliment. 6: 33-35 (1943).
: Cancer Research 4: 510-511 (1944).
Iglesias, R. *See* Lipschütz, A.
Ignjatchev, J. *See* Chahovitch, S.X.
Iki, H. *See* Masayama, T.
Ilfeld, F.W.: Am. J. Cancer 26: 743-753 (1936).
Ilfeld, F.W. *See* Shear, M.J.
Imakyure, T. *See* Imura, T.; Kimura, T.
Imura, T. and Imakyure, T.: Tr. Jap. Path. Soc. 27: 6-11 (1937).
Ing, H.R. *See* Twort, C.C.
Ingle, D.J.: Endocrinology 34: 361 (1944).
Ingraham, L.P.: *See* Bischoff, F.
Isaacs, R.: Proc. Soc. Exper. Biol. & Med. 45: 246-248 (1940a).
: Proc. Soc. Exper. Biol. & Med. 45: 794-795 (1940b).
Isaacs, R. *See* Lin, H.A.C.
Ishimura, I. *See* Satani, Y.
Ishiwara, F. and Saga, K.: Gann 33: 240-241 (1939).
: Gann 34: 194-197 (1940).
Isibasi, M.: Tr. Jap. Path. Soc. 25: 690-693 (1935).
Isikawa, Y. *See* Satani, Y.
Israel, S.L. *See* Mazer, C.
Ito, S.: Gann 33: 453-454 (1939).
: Gann 34: 21-32 (1940a).
: Gann 34: 133-137 (1940b).
: Gann 34: 305-308 (1940c).
: Gann 35: 182-185 (1941a).
: Gann 35: 346-349 (1941b).
Itoh, M., Ueno, F. and Kashiwabara, S.: Folia endocrinol. japon. 17: 18-19 (1941).
Ivy, A.C. *See* Roth, J.A.
Iwamoto, H.K. *See* Krantz, J.C., Jr.
Iwata, S. and Inui, S.: Trans. Jap. Path. Soc. 30: 202-206 (1940a).
: Trans. Jap. Path. Soc. 30: 212-216 (1940b).

J

Jacobi, H.P. and Baumann, C.A.: Am. J. Cancer 39: 338-342 (1940).
Jacobi, H.P. *See* Baumann, C.A.
Jacqmin, L. *See* Maisin, J.
Jacobson, L.A.: Endocrinology 34: 240-244 (1944).
Jadassohn, W., Uehlinger, E. and Fierz, H.E.: Schweiz. med. Wchnschr. 71: 6-8 (1941).
Jaffe, L.: *See* Moehlig, R.C.
Jaffe, R.: Zentralbl. f. allg. Path. u. path. Anat. 31: 57-63 (1920).
Janes, R.G.: Endocrinology 31: 354-358 (1942).
Jedlicky, A., Lipschütz, A., and Vargas, L. Jr.: Compt. rend. Soc. de biol. 130: 1466-1469 (1939).
Jedlicky, A. *See* Lipschütz, A.
Jefferson, N.C. *See* West, H.D.
Jenkins, L. *See* Foster, R.H.K.
Jenrette, W.V. *See* Fairhall, L.T.
Jensen, M. Maas: Publ. med. exper. Chile 16: 1-19 (1942).
Jervis, G.A. *See* Ferraro, A.
Joannovic, G.: Klin. Wchnschr. 50: 2302 (1923).
John, C.O., Finks, A.J. and Alsberg, C.L.: J. Pharmacol. & Exper. Therap. 21: 59-64 (1923).
Johnson, A. *See* Johnson, V.
Johnson, C.C. *See* Hanzlik, P.J.
Johnson, J.M. *See* Morris, H.P.
Johnson, R.O. *See* Rusch, H.P.

Johnson, V., Carlson, A.J. and Johnson, A.: Am. J. Physiol. 103: 517-534 (1933).
Jones, E.E.: Am. J. Cancer 39: 94-99 (1940).
: Cancer Research 1: 787-789 (1941).
: Cancer Research 3: 168-172 (1943).
Jones, G.E.S., Delfs, E. and Foote, E.C.: Endocrinology 38: 337-344 (1946).
Jones, R.N.: Cancer Research 2: 252-255 (1942).
Jones, S.W. *See* Fairhall, L.T.
Jores, L.: München, med. Wchnschr. 54: 879-881 (1907).
Josephs, L.: Proc. Soc. Exper. Biol. & Med. 41: 334-336 (1939).
Joshel, L.M. *See* Newmann, M.S.
Joyet, G.: Schweiz. med. Wchnschr. 72: 1077-1078 (1942).
Judina, N.D. *See* Yudina, N.D.
Jungck, E.C. *See* Heller, C.G.
Junkmann, K. *See* Arnold, O.
Just, A.: Compt. rend. Soc. de biol. 137: 685-686 (1943).
Justin-Besancon, L. *See* Chiray, M.

K

Kahlau, G.: Frankfurt. Ztschr. f. path. 50: 281-288 (1937).
Kahlau, G. *See* Rajewsky, B.
Kandel, E.V. *See* LeRoy, G.V.
Kaplan, H.S. and Kirschbaum, A.: Proc. Soc. Exper. Biol. & Med. 55: 262-264 (1944).
Kaplan, H.S. *See* Kirschbaum, A.
Karzynski, B.S. *See* Von Euler, H.
Kashiwabara, S. *See* Itoh, M.
Kasiwabara, N.: Osaka Igakkai Zasshi. 40: 706 (1941).
Kasiwabara, N. *See* Morigami, S.
Kaunitz, H., Pappenheimer, A.M. and Schogoleff, C.: Am. J. Path. 20: 247-254 (1944).
Kawabata, K.: Osaka Igakkai Zasshi 36: 364-365 (1937).
Kelly, M.G. *See* White, F.R.
Kendal, L.P. *See* Berenblum, I.
Kennaway, E.L.: Brit. M.J. 1: 564-567 (1924a).
: J. Indust. Hyg. 5: 462-488 (1924b).
: J. Path. & Bact. 27: 233-238 (1924c).
: Biochem. J. 24: 497-504 (1930).
Kennaway, E.L. and Hieger, I.: Brit. M.J. 1: 1044-1046 (1930).
Kennaway, E.L., Kennaway, N.M. and Warren, F.L.: Cancer Research 2: 157-159 (1942).
Kennaway, E.L. *See* Bachmann, W.E.; Barry, G.; Burrows, H.; Cook, J.W.; Leitch, A.
Kennaway, N.M. (Mrs.) *See* Bachmann, W.E.; Badger, G.M.; Burrows, H.; Kennaway, E.L.; Cook, J.W.
Kennedy, N.K. *See* Hanzlik, P.J.
Kennedy, T.H.: Nature 150: 233-234 (1942).
Kensler, C.J. *See* Burk, D.; du Vigneaud, V.; Sugiura, K.
Keston, A.S., Goldsmith, E.D., Gordon, A.S. and Charipper, H.A.: J. Biol. Chem. 152: 241-244 (1944).
Keston, H.D., Mulinos, M.G. and Pomerantz, L.: J.A.M.A. 109: 1509-1511 (1937).
: Arch. Path. 27: 447-465 (1939).
Khaletskaia, F.M. *See* Schabad, L.M.
Kibick, E.A. *See* Simpson, M.E.
Kim, S.S. *See* Yun, I.S.
Kin, C. *See* Yoshida, T.
Kinard, F.W. and Aull, J.C.: J. Pharmacol. & Exper. Therap. 83: 53-55 (1945).
King, E.J., Rogers, N., Gilchrist, M., Goldsmidt, V.M. and Nagelschmidt, G.: J. Path. & Bact. 57: 488-491 (1945a).
: J. Path. & Bact. 57: 491-493 (1945b).
King, H.D. *See* Lewis, M.R.
Kinoshita, R. *See* Kinosita, R.
Kinosita, R.: Gann 30: 423-426 (1936a).
: Osaka Igaku Zasshi 35: 403 (1936b).
: Tr. Jap. Path. Soc. 27: 665-727 (1937).
: Jap. J. Gastroenterol. 37: 513-592 (1938a).
: Osaka Igaku Zasshi 37: 594 (1938b).
: Osaka Igaku Zasshi 37: 828 (1938c).
: Gann 33: 225-229 (1939).
: Yale J. Biol. Med. 12: 287-300 (1940a).
: Gann 34: 165-167 (1940b).
Kinosita, R. and Harada, M.: Gann 32: 225-229 (1938).
Kirby, A.H.M.: Cancer Research 3: 519-525 (1943).
: Cancer Research 4: 94-97 (1944a).
: Nature 154: 668-669 (1944b).
: Cancer Research 5: 129-134 (1945a).
: Cancer Research 5: 673-682 (1945b).
: Brit. J. Cancer 1: 68-79 (1947).
Kirby, A.H.M. and Peacock, P.R.: Brit. J. Exper. Path. 27: 179-189 (1946).
: J. Path. and Bact. 59: 1-17 (1947).
Kirby, A.H.M. *See* Beck, S.; Peacock, P.R.
Kirkpatrick, C.M. and Andrews, F.N.: Endocrinology 34: 340-345 (1944).
Kirschbaum, A. and Bell, E.T.: Proc. Soc. Exper. Biol. and Med. 64: 71-72 (1947).
Kirschbaum, A. and Kaplan, H.S.: Science 100: 360-361 (1944).

Kirschbaum, A., Lawrason, F.D., Kaplan, H.S. and Rittner, J.J.: Proc. Soc. Exper. Biol. Med. 55: 141-142 (1944).
Kirschbaum, A. and Strong, L.C.: Cancer Research 2: 841-845 (1942).
Kirschbaum, A., Strong, L.C. and Gardner, W.V.: Proc. Soc. Exper. Biol. & Med. 45: 287-289 (1940).
Kirschbaum, A., Williams, W.L. and Rittner, J.J.: Cancer Research 6: 354-362 (1947).
Kirschbaum, A. *See* Gardner, W.U.; Kaplan, H.S.; Lawrason, F.D.
Kirsner, J.B.: Arch. Path. 32: 76-84 (1941).
Kishi, A. and Nakahara, W.: Gann 34: 252-254 (1940).
Kitzmiller, K.V. *See* Deichmann, W.B.; Machle, W.
Klaarenbeck, F.W.: Nederl. tijdschr. v. geneesk. 85: 4441 (1941).
Klein, W. *See* Fränkel, E.
Kleinenberg, G.E.: Arch. biol. nauk. 62: 30-34 (1941).
Kleinenberg, G.E. *See* Shabad, L.M.
Kleinenberg, M.E.: Arch. des sc. biol., Moscow 51 (3): 127-136 (1938).
: Arch. des sc. biol., Moscow 56 (3): 39-46 (1939a).
: Arch. des sc. biol., Moscow 56 (3): 48-52 (1939b).
Klenitzky, J.S.: Arch. des sc. biol., Moscow 56 (3): 59-62 (1939).
: Bull. biol. et med. exper. URSS 9: 3-6 (1940a).
: Arch. des sc. biol., Moscow 56: 94-7 (1940b).
Kline, A.J., and Palmer, W.L.: Arch. Path. 29: 814-844 (1940).
Kline, B.E., Miller, J.A., Rusch, H.P. and Baumann, C.A.: Cancer Research 5: 641-643 (1945).
: Cancer Research 6: 1-4 (1946a).
: Cancer Research 6: 5-7 (1946b).
Kline, B.E. and Rusch, H.P.: Cancer Research 4: 762-767 (1944).
Kline, B.E., Rusch, H.P., Baumann, C.A. and Lavik, P.S.: Cancer Research 3: 825-829 (1943).
Kline, B.E. *See* Baumann, C.A.; Miller, J.A.; Rusch, H.P.
Knotts, F.L. *See* Poth, E.J.
Knudsen, L.F. *See* Fitzhugh, O.G.
Koch, C., Schreiber, B. and Schreiber, G.: Bull. Assoc. franç. p. l'étude du cancer. 28: 852-859 (1939).
Koch, F.C. *See* Steele, R.; Steiner, P.E.
Koch, J. *See* Wagner-Jauregg, T.
Kochakian, C.D.: Endocrinology 26: 54-60 (1940).
: Endocrinology 28: 478-484 (1941).
: Am. J. Physiol. 145: 549-556 (1945).
Kochakian, C.D. and Fox, R.: J. Biol. Chem. 153: 669-674 (1944).
Koelle, B.G. and Gilman, A.: J. Pharmacol. and Exper. Therap. 87: 435-448 (1946).
Koelle, E.S. *See* Mattis, P.A.
Kohlsteadt, J.M. *See* Scott, C.C.
Kohn, H.I. *See* Harris, J.S.
Kok, D.J. *See* de Jongh, S.E.
Koletsky, S. *See* Zamecnik, P.C.
Komatsu, K. *See* Maruya, H.
Kon, G.A.R. *See* Haddow, A.
Koneff, A.A.: Endocrinology 34: 77-82 (1944).
Koneff, A.A., Simpson, M.E. and Evans, H.M.: Anat. Record. 94: 169-187 (1946).
Koneff, A.A. *See* Wainman, P.
Koppanyi, T. *See* Vivino, A.E.
Koref, O., Lipschütz, A., and Vargas, L., Jr.: Compt. rend. Soc. de biol. 130: 303-306 (1939).
Koref, O. *See* Lipschütz, A.
Korenchevsky, V.: J. Path. & Bact. 52: 268-272 (1941).
Korenchevsky, V., Burbank, R., and Hall, K.: Biochem. J. 33: 366-371 (1939a).
Korenchevsky, V. and Dennison, M.: Biochem. J. 28: 1474-1485 (1934).
Korenchevsky, V. and Hall, K.: Nature, London 142: 998 (1938).
: Brit. M.J. 1: 4-8 (1939).
: J. Path. & Bact. 50: 295-315 (1940).
Korenchevsky, V., Hall, K. and Burbank, R.: Biochem. J. 33: 372-380 (1939b).
Korenchevsky, V., Hall, K. and Ross, M.A.: Biochem. J. 33: 213-222 (1939c).
Korenchevsky, V. *See* Hume, E.M.
Kornberg, A., Daft, F.S. and Sebrell, W.H.: Pub. Health Rep. 59: 832-844 (1944).
Kornberg, A., Endicott, K.M., Daft, F.S. and Sebrell, W.H.: Pub. Health Rep. 60: 661-675 (1945).
Kornberg, A. *See* Endicott, K.M.
Korosteleva, T.A.: Laboratorneiv. praktika. 15: 1-2 (1940a).
: Uspekhi. Sovem. Biol. 13: 507-524 (1940b).
Korosteleva, T.A. and Shabad, L.M.: Bull. biol. et méd. expér. URSS 10: 107-109 (1940).
Korteweg, R.: Nederl. tijdschr. v. geneesk. 76: 2871-2875 (1932).
Korteweg, R. and Thomas, F.: Am. J. Cancer 37: 36-44 (1939).

Korteweg, R. *See* van Gulik, P.J.
Krakower, C. *See* Engle, E.T.
Kradhl, M.E. *See* Harris, P.N.
Krantz, J.C. Jr., Iwamoto, H.K. and Farson, de C.B.: Current Researches in Anesth. & Analg. 25: 221-226 (1946).
Krantz, J.C. Jr. *See* Ellis, F.W.
Krebs, C.: Ztschr. f. Immunitätsforsch. u. exper. therap. 59: 203-218 (1928).
Krehbiel, O.F. *See* Haagensen, C.D.
Krekels, A.: Frankfurt. Ztschr. f. Path. 49: 322-330 (1936).
Kremp, H.: Med. Univ. Klin. Göttingen, Diss. (1941).
Krems, A.D., Martin, A.W. and Dille, J.M.: J. Pharmacol. & Exper. Therap. 71: 215-221 (1941).
Krolkova, N.D.: Uprosi Onkologii, Medgiz. Narkomzdrav, Moscow. 331-339 (1940).
Krotkina, N. *See* Petroff, N.
Krueger, E. *See* Ludden, J.B.
Kudssus, H. *See* Butenandt, A.
Kueter, K. *See* Richards, R.K.
Kuhlmann, D., Ragan, C., Ferrebee, J.W., Atchley, D.W. and Loeb, R.F.: Science 90: 496-497 (1939).
Kunewalder, E. *See* Bauer, J.
Kupperman, H.S. *See* Greenblatt, R.B.
Kurland, A.A. *See* Rubinstein, H.S.
Kurzrok, R. *See* Perloff, W.H.

L

Laborde, A. *See* Dominici, H.
Laborde, S. *See* Dominici, H.
Lacassagne, A.: Compt. rend. Acad. d. sc. 195: 630-632 (1932).
: Compt. rend. Acad. d. sc. 113: 590-592 (1933a).
: Compt. rend. Acad. d. sc. 114: 427-429 (1933b).
: Compt. rend. Acad. d. sc. 114: 660-662 (1933c).
: Compt. rend. Acad. d. sc. 120: 685-689 (1935a).
: Libro de Oro, pp. 715-721 (1935b).
: Paris med. 95: 233-240 (1935c).
: Am. J. Cancer 27: 217-228 (1936a).
: Am. J. Cancer 28: 735-740 (1936b).
: Compt. rend. Soc. de biol. 121: 607-609 (1936c).
: Compt. rend. Soc. de biol. 122: 183-184 (1936d).
: Compt. rend. Soc. de biol. 126: 190-192 (1937a).
: Compt. rend. Soc. de biol. 126: 193-195 (1937b).
: Compt. rend. Soc. de biol. 126: 385-387 (1937c).
: Bull. Assoc. franç. p. l'étude du cancer 27: 96-116 (1938a).
: Compt. rend. Soc. de biol. 129: 641-643 (1938b).
: Am. J. Cancer 37: 414-424 (1939a).
: Compt. rend. Soc. de biol. 132: 365-368 (1939b).
Lacassagne, A., Buu-Hoï, N.P. and Cagniant, P.: Compt. rend. Soc. de biol. 138: 16-17 (1944a).
Lacassagne, A., Buu-Hoï, N.P., Daudel, R. and Rudali, G.: Compt. rend. Soc. de biol. 138: 282-284 (1944b).
Lacassagne, A., Buu-Hoï, N.P., Lecocq, J. and Rudali, G.: Bull. Assoc. franç. p. l'étude du cancer 33: 48-59 (1946).
Lacassagne, A., Buu-Hoï, N.P., Royer, R. and Zajdela, F.: Compt. rend. Soc. de biol. 141: 635-637 (1947).
Lacassagne, A. and Chamoro, A.: Compt. rend. Soc. de biol. 131: 1077-1078 (1939).
Lacassagne, A. and Daruysz, S.: Compt. rend. Soc. de biol. 135: 1130-1132 (1941).
Lacassagne, A. and Latarjet, R.: Compt. rend. Soc. de biol. 138: 351-353 (1944).
: Compt. rend. Soc. de biol. 139: 443-445 (1945).
: Cancer Research 6: 183-188 (1946).
Lacassagne, A., Lattès, J. and Lavedan, J.: J. de radiol. et d'électrol. 9: 67-82 (1925).
Lacassagne, A., and Nyka, W.: Compt. rend. Soc. de biol. 121: 822-824 (1936).
: Bull. Assoc. franç. p. l'étude du cancer 26: 154-161 (1937a).
: Compt. rend. Soc. de biol. 124: 935-938 (1937b).
: Compt. rend. Soc. de biol. 126: 1112-1115 (1937c).
Lacassagne, A. and Raynaud, A.: Compt. rend. Soc. de biol. 124: 1183-1186 (1937a).
: Compt. rend. Soc. de biol. 124: 1186-1189 (1937b).
: Compt. rend. Soc. de biol. 130: 689-693 (1939a).
: Compt. rend. Soc. de biol. 131: 586-583 (1939b).
: Compt. rend. Soc. de biol. 132: 431-434 (1939c).
Lacassagne, A. and Rudali, G.: Compt. rend. Soc. de biol. 138: 299-300 (1944).
Lacassagne, A. *See* Buu-Hoï, N.P.; Rudali, G.
Lachmann, E. *See* Turner, H.H.
Laclau, N.C. and Matheu, C.P.: Rev. Soc. argent. de biol. 5: 745-767 (1929).
Lacroix, L. *See* Seyale, G.C.
Laduron, H. *See* Picard, E.
Lambin, P.: Compt. rend. Soc. de biol. 111: 225-227 (1932).

Lambret, O., Driessens, J. and Cornillot, M.: Compt. rend. Soc. de biol. 124: 61-62 (1936a).
: Echo med. du Nord 6: 533-543 (1936b).
Lamont, A. See Shumacker, H.B., Jr.
Lampas, H. See Enger, R.
Landauer, W., Pfeiffer, C.A., Gardner, W.U. and Man, E.B.: Proc. Soc. Exper. Biol. & Med. 41: 80-82 (1939).
Landauer, W. and Zondek, B.: Am. J. Path. 20: 179-209 (1944).
Landsberg, J.W. See Hueper, W.C.
Langer, E.: Ztschr. f. Krebsforsch. 56: 443-454 (1942).
Langer, E. See Buschke, A.; Hamperl, H.
Langworthy, O.R. See Vest, S.A.
Lanza, G.: Boll. Soc. med.-chir., Catania 6: 185-193 (1938a).
: Pathologica 30: 185-189 (1938b).
: Arch. di biol. normale et patologica 1o Sper. 95: 141-169 (1941).
Lanza, G. See de Gaetani.
Lanzara, A.: Med. sper. Arch. ital. 10: 142-144 (1942).
Lapidari, M.: Boll. d. Soc. med.-chir., Pavia 2: 763-765 (1927).
Lapinsohn, L.: Hahneman. Monthly 78: 487-493 (1943).
Laqueur, G.L.: Proc. Soc. Exper. Biol. & Med. 55: 268-270 (1944).
Laqueur, E., Borchardt, E., Dingemanse, E. and de Gough, S.C.: Deutsche med. Wchnschr. 54: 465-467 (1928).
Laqueur, G.L. and Flukmann, C.F.: Endocrinology 30: 93-101 (1942).
Laqueur, G.L. See Hanzlik, P.J.
Larionow, L.F. and Soboleva, N.G.: Vestnik Rentgen. Radiol. 20: 276-286 (1938).
Larionow, L.F.: Arch. des sc. biol., Moscow 56 (3): 32-38 (1939).
: Am. J. Cancer 38: 492-505 (1940).
: Cancer Research 1: 860-868 (1941).
Larsen, C.D.: J. Nat. Cancer Inst. 8: 99-101 (1947).
Larsen, C.D. and Barrett, M.K.: J. Nat. Cancer Inst. 4: 587-594 (1944).
Larsen, C.D. and Heston, W.E.: Cancer Research 5: 592 (1945).
Larsen, C.D. Rhoads, P.B. Jr., and Weed, L.L.: J. Nat. Cancer Inst. 7: 5-8 (1946).
Larsen, C.D., Weed, L.L. and Rhoads, P.B. Jr.: J. Nat. Cancer Inst. 8: 63-69 (1947).
Lasley, J.F. See Bogart, R.
Lasichak, A.G. See Levey, S.
Lasnitzki and Woodhouse, D.L.: Nature 150: 660 (1942).
: J. Anat. 78: 121-129 (1944).
Latarjet, R. See Lacassagne, A.
Latta, J.S. and Davis, L.T.: Arch. Path. 31: 55-67 (1941).
Lattès, J. See Lacassagne, A.
Latven, A.R. See Welch, A.D.
Laubender, W. and Barth, F.: Arch. Exper. Path. and Pharmacol. 198: 5-11 (1941).
Lauber, H.J., Hildebrand, E. and Schocke, H.: Ztschr. f. d. ges. exper. med. 105: 370-394 (1939).
Lauber, H.J., Schocke, H., and Bersin, T.: München. med. Wchnschr. 85: 1741-1744 (1938).
Lauche, A. See Naegeli, T.
Laug, E.P. and Morris, H.P.: J. Pharmacol. & Exper. Therap. 64: 388-410 (1938).
Laug, E.P. See Calvery, H.O.; Grant, R.L.; Morris, H.P.
Lauridsen, J. and Eggers, H.E.: Cancer Research 3: 43-46 (1943).
Lauter, W.M. and Vrla, V.L.: J. Am. Pharm. A. 29: 5-8 (1940).
Lavedan, J. See Lacassagne, A.
Lavik, P.S. and Baumann, C.A.: Cancer Research 1: 181-187 (1941).
: Cancer Research 3: 749-756 (1943).
Lavik, P.S., Moore, P.R., Rusch, H.P. and Baumann, C.A.: Cancer Research 2: 189-192 (1942).
Lavik, P.S. See Baumann, C.A.; Kline, B.E.
Lavin, G.I. See Dobriner, K.
Law, L.W.: Science 91: 96-97 (1946).
: Cancer Research 1: 564-571 (1941a).
: Am. J. Path. 17: 827-831 (1941b).
: Cancer Research 1: 397-401 (1941c).
Law, L.W. and Lewisohn, M.: Proc. Soc. Exper. Biol. & Med. 43: 143-146 (1940).
: Cancer Research 1: 695-698 (1941).
Lawrason, F.D. and Kirschbaum, A.: Proc. Soc. Exper. Biol. & Med. 56: 6-7 (1944).
Lawrence, J.H., and Gardner, W.U.: Am. J. Cancer 33: 112-119 (1938).
Lawrence, W.S. See Hanzlik, P.J.
Lawson, W. See Dodds, E.C.
Leach, B.E. See Forbes, J.C.
Leavy, S. See Ackart, R.J.
Lebenson, E.G. See Magat, M.A.
Lecannelier, S. See Egana, E.; Lipschütz, A.
Lecocq, J. See Buu-Hoi, N.P.; Lacassagne, A.; Rudali, G.
Lederman, J.M. See Cameron, A.T.
Lees, J.C.: Quart. J. Exper. Physiol. 27: 161-170 (1937a).

: Quart. J. Exper. Physiol. 27: 171-180 (1937b).
Lefevre, H. *See* Engelbreth-Holm, J.
Lehman, A.J. *See* Hanzlik, P.J.
Lehr, D. *See* McGavak, T.H.
Leinati, F.: Boll. d. Soc. med.-chir., Pavia 53: 407-415 (1939).
Leitch, A. and Kennaway, E.L.: Brit. M.J. 2: 1107-1108 (1922a).
: Leeuw.-Vereen. 1: 50-51 (1922b).
Leiter, J. and Shear, M.J.: J. Nat. Cancer Inst. 3: 455-477 (1943).
Leiter, J.: *See* Shear, M.J.; Shimkin, M.B.
Lemon, H.M. *See* Robertson, O.H.
Lendrum, F.S. *See* Hisaw, F.L.
Lepkovsky, S. *See* Evans, H.M.
Leroy, G.V., Kandel, E.V. and Brunschwig, A.: Am. J. Cancer, 32: 449-452 (1938).
Lester, W. Jr. *See* Robertson, O.H.
Letard, H. and de Sacy, G.S.: Compt. rend. Soc. de biol. 139: 353-354 (1945).
Lettinga, T.W.: De Carcinogene Werking van Kleine Doses 1:2:5:6- Dibenzanthraceen. 80 pp. Diss., Amsterdam (1937).
Lettré, H. and Fernholz, E.: Ber. d. deutsch. chem. Gesellsch. 73: 436-441 (1940).
Leuchtenberger, R.: Am. J. Path. 16: 651 (1940).
Leuchtenberger, R. and Sicher, G.: Arch. Path. 31: 189-203 (1941).
Levey, S., Lasichak, A.G., Brimi, R., Orten, J.M., Smyth, C.J. and Smith, A.H.: J. Am. Pharm. A. 35: 298-304 (1946).
Levi, A.A. and Boyland, E.: Chem. and Indust. 15: 446 (1937).
Levi, A.A. *See* Boyland, E.
Levie, L.H. *See* Gaarenstroom, J.H.
Levine, M. and Bergmann, H.: Am. J. Cancer 39: 504-520 (1940).
Lewis, A.A. and Turner, C.W.: Am. Soc. Animal Production, Proc. 33rd Ann. Meeting 63-66 (1940).
: J. Dairy Sc. 24: 845-860 (1941).
: Endocrinology 31: 520-528 (1942).
Lewis, D. *See* Geschickter, C.F.
Lewis, L.A. and McCullagh, E.P.: J. Clin. Endocrinol. 2: 502-506 (1942).
Lewis, M.R.: Am. J. Cancer 29: 510-516 (1937).
: Am. J. Cancer 34: 399-406 (1938a).
: Am. J. Cancer 34: 431-433 (1938b).
: Bull. Johns Hopkins Hosp. 66-67: 325-344 (1940).
Lewis, M.R. and King, H.D.: Anat. Rec. 94: 25-34 (1946).
Lewis, M.R. and Lichtenstein, E.G.: Growth 1: 375-383 (1937).
Lewis, W.H.: Am. J. Cancer 37: 521-530 (1939).
Lewis, W.G.: *See* Mulligan, R.M.
Lewisohn, M.G. *See* Bradbury, J.T.; Law, L.W.
Li, C.H. *See* Becks, H.; Evans, H.M.
Li, M.H. and Baldwin, F.M.: Proc. Soc. Exper. Biol. & Med. 57: 165-167 (1944).
Liberti, V.: Clin. chirurg. 14: 541-557 (1938).
: Riv. di pat. sper. 22: 307-334 (1939).
Lichtenstein, E.G. *See* Lewis, M.R.
Liégeois, P. *See* Maisin, J.
Lightbody, H.D., and Mathews, J.A.: Indust. & Engin. Chem. 28: 809-811 (1936).
Lignac, G.O.E.: Krankheitsforchung 9: 403-453 (1932).
: Klin. Wchnschr. 12: 109-110 (1933).
Ligneris, M.J.A.: Am. J. Cancer 40: 1-46 (1940).
Lillie, R.D. and Smith, M.I.: U.S. Pub. Health Rep. 59: 979-984 (1944).
Lillie, R.D., Smith, M.I., Stohlman, E.F.: Arch. Path. 43: 127-142 (1947).
Lillie, R.D. *See* McClosky, W.T.; Smith, M.I.
Lin, H.A.C. and Isaacs, R.: Proc. Soc. Exper. Biol. & Med. 43: 551-553 (1940).
Lindberg, H.A., Wald, M.H. and Barker, M.H.: Am. Heart J. 21: 605-616 (1941).
Link, K.P. *See* Field, J.B.
Linn, J.G. *See* Sayers, R.R.
Lippman, H.N. and Saunders, J.B. deC. M.: J. Endocrinol. 3: 370-383 (1944).
Lipschütz, A.: Livro de Homenagem, Rio de Janeiro 413-424 (1939b).
: Prim. Cong. chileno y Am. de cir. 252-282 (1939a).
: Rev. med. de Chile 68: 1385-1393 (1940).
: Soc. de biologia. Aug. 20 (1941).
Lipschütz, A. and Acũna, L.: Rev. Canad. biol. 3: 96-107 (1944).
Lipschütz, A., Becker, C., Mello, R.F. and Riesco, A.: Science 101: 410-411 (1945a).
Lipschütz, A., Belolio, P., Chaume, J. and Vargas, L., Jr.: Proc. Soc. Exper. Biol. & Med. 46: 164-167 (1941b).
Lipschütz, A., Bruzzone, S. and Fuenaleda, F.: Proc. Soc. Exper. Biol. & Med. 54: 303-304 (1943).
: Cancer Research 4: 179-185 (1944).

Lipschütz, A. and Carrasco, R.: Rev. de Med. y Aliment. 6: 11-13 (1943).
: Rev. Canad. biol. 3: 108-125 (1944).
Lipschütz, A., Egaña, E., Szabo, I. and Lecannelier, S.: Proc. Soc. Exper. Biol. & Med. 46: 161-164 (1941a).
Lipschütz, A. and Grismali, G.: Cancer Research 4: 186-190 (1944).
Lipschütz, A. and Iglesias, R.: Compt. rend. Soc. de biol. 129: 519-524 (1938a).
: Compt. rend. Soc. de biol. 129: 524-528 (1938b).
Lipschütz, A., Iglesias, R. and Vargas, L., Jr.: Compt. rend. Soc. de biol. 130: 1536-1540 (1939a).
Lipschütz, A., Luco, J.V. and Zañartu, J.: Cancer Research 2: 200-203 (1942b).
Lipschütz, A. and Maas, M.: Cancer Research 4: 18-23 (1944).
Lipschütz, A., Murillo, R. and Vargas, L., Jr.: Lancet 237: 420-421 (1939b).
Lipschütz, A., Murillo, R., Vargas, L., Jr., and Koref, O.: Compt. rend. Soc. de biol. 131: 208-211 (1939c).
Lipschütz, A., Nuñez, C. and Zañartu, J.: Soc. de biolgia Oct. 28 (1941c).
Lipschütz, A., Rodriguez, F. and Vargas, L., Jr.: Compt. rend. Soc. de biol. 130: 939-942 (1939d).
: Endocrinol. 28: 664-668 (1941d).
Lipschütz, A., Thibaut, R.T. and Vargas, L., Jr.: Cancer Research 2: 45-51 (1942a).
Lipschütz, A. and Vargas, L., Jr.: Compt. rend. Soc. de biol. 130: 9-11 (1939a).
: Compt. rend. Soc. de biol. 130: 596-599 (1939b).
: Lancet, 236: 1313-1318 (1939c).
: Lancet 238: 541-543 (1940).
: Proc. Soc. Exper. Biol. & Med. 48: 464-467 (1941a).
: Endocrinology 29: 622-627 (1941c).
: Endocrinology 28: 669-675 (1941d).
: Lancet 568-570 (1941e).
Lipschütz, A., Vargas, L., Jr., Baeza-Rosales, H. and Baeza-Herrera, H.: Proc. Soc. Exper. Biol. & Med. 46: 76-78 (1941e).
Lipschütz, A., Vargas, L., Jr., Egaña, E. and Bruzzone, S.: Proc. Soc. Exper. Biol. & Med. 48: 467-471 (1941f).
Lipschütz, A., Vargas, L., Jr., Jedlicky, A. and Bellolio, P.: Am. J. Cancer 39: 185-198 (1940).
Lipschütz, A., Vargas, L., Jr. and Palma, J.: Cancer Research 1: 575-579 (1941g).
Lipschütz, A., Vargas, L., Jr., and Ruz, O.: Lancet 237: 867-870 (1939d).
Lipschütz, A., Vera, O. and Gonzalez, S.: Cancer Research 2: 204-209 (1942c).
Lipschütz, A., Yamine, D., Schwarz, J., Bruzzone, S., Acuña, J. and Silberman, S.: Cancer Research 5: 515-523 (1945b).
Lipschütz, A. and Zañartu, J.: Soc. de biologia, Dec. 5, (1941).
: Endocrinology 31: 192-196 (1942).
Lipschütz, A. *See* Iglesias, R.; Jedlicky, A.; Koref, O.; Quintana, U.; and Vargas, L., Jr.
Lipschütz, B.: Arch. Dermat. and Syph. 147: 520-523 (1924).
Lischer, C.E. *See* Paletta, F.X.
Lisco, H. and Biskind, G.R.: Endocrinology 29: 772-778 (1941).
Lisco, H., Finkel, M.P. and Brues, A.M.: Radiology 49: 361-363 (1947).
Little, C.C. *See* Wooley, G.W.
Litzka, G.: Arch. f. exper. path. u. Pharmakol. 183: 427-435 (1936).
Litzka, G. *See* May, H.
Livingston, W.H. *See* Hill, R.M.
Ljvraga, P.: Pathologica 26: 726-735 (1934).
Locatelli, P.: Tumori 21: 122-129 (1947).
Lockhead, M.S. *See* Perry, I.H.
Loeb, L., Burns, E.L., Suntzeff, V. and Moskop, M.: Proc. Soc. Exper. Biol. & Med. 35: 320-322 (1936).
: Am. J. Cancer 30: 47-54 (1937).
Loeb, L., Suntzeff, V. and Burns, E.L.: Am. J. Cancer 35: 159-174 (1939).
Loeb, L., Suntzeff, V., Burns, E.L. and Schenken, J.R.: Arch. Path. 38: 52-59 (1944).
Loeb, L. *See* Burns, E.L.; Crossen, R.J.; Suntzeff, V.
Loeb, R.F. *See* Kuhlmann, D.
Loeffel, E. *See* MacBride, C.M.
Loeffler, M.K. *See* Fardon, J.C.
Loeffler, N.: Ztschr. f. physiol. Chem. 178: 186-191 (1928).
Loeper, M., Cottet, J. and Tanaseco, C.: Compt. rend. Soc. de biol. 135: 866-868 (1941).
Loeser, A.: Ztschr. f. d. ges. exper. Med. 105: 430-446 (1939).
: Lancet 241: 698-700 (1941).
Loeser, A. *See* Arnold, O.H.; Grumbrecht, P.
Lojkin, M.E. *See* Mulinos, M.G.
Long, L., Jr. *See* Fieser, L.F.
Long, M.L. *See* Bischoff, F.
Loomis, R.N. *See* Bogen, E.
Loomis, T.A. *See* Drill, V.A.

Loon, E.J.V. and Clark, R.R.: J. Lab. Clin. Med. 29: 942-956 (1944).
Loosli, C.G. *See* Robertson, O.H.
Lopez, E.: Nature, London 156, 296-297 (1945).
Lorenz, E. and Andervont, H.B.: Pub. Health Rep. 52: 637-647 (1937).
: Arch. Path. 29: 484-493 (1940).
Lorenz, E. and Shear, M.J.: Am. J. Cancer 26: 333-343 (1936).
Lorenz, E., Shimkin, M.B. and Stewart, H.L.: J. Nat. Cancer Inst. 1: 355-360 (1941).
Lorenz, E. and Stewart, H.L.: J. Nat. Cancer Inst. 1: 17-40 (1940a).
: J. Nat. Cancer Inst. 1: 273-276 (1940b).
: Cancer Research 1: 743 (1941).
: J. Nat. Cancer Inst. 7: 227-238 (1947).
Lorenz, E. *See* Andervont, H.B.; Shear, M.J.; Shimkin, M.B.; Stewart, H.L.
Lorenz, F.W.: Poultry Science 23: 458-459 (1944).
: Poultry Science 24: 91-92 (1945a).
: Poultry Science 24: 128-134 (1945b).
Low, F.N. and Ferrill, H.W.: Endocrinology 29: 1027-1028 (1941).
Lucas, J.T. *See* Mulligan, R.M.
Luce-Clausen, E.M. *See* Morton, J.J.
Luco, J.V. *See* Lipschütz, A.
Ludden, J.B., Bruger, M. and Wright, I.S.: Endocrinology 28: 999-1001 (1941b).
: Arch. Path. 33: 58-62 (1942).
Ludden, J.B., Krueger, E. and Wright, I.S.: Endocrinology 28: 619-623 (1941a).
Ludwig, F. *See* Gordonoff, T.
Lundberg, W.O., Barnes, R.H., Clausen, M. and Burr, G.O.: J. Biol. Chem. 153: 265-274 (1944).
Lusky, M.L., Brown, H.A. and Woodward, G.: Cancer Research 7: 667-668 (1947).
Lynch, C.J.: Proc. Soc. Exper. Biol. & Med. 33: 401-403 (1935).
: Cancer Research 1: 740 (1941).
: Proc. Soc. Exper. Biol. & Med. 52: 368-371 (1943).
Lyons, W.R. and Pencharz, R.I.: Proc. Soc. Exper. Biol. & Med. 33: 589-592 (1936).
Lyons, W.R. and Sako, Y.: Proc. Soc. Exper. Biol. & Med. 44: 398-401 (1940).
Lyster, S.C. *See* Nelson, J.W.

M

Maas, L.C. *See* Stowell, R.E.
Maas, M. *See* Jensen; Lipschütz, A.
MacBride, C.M., Freedman, H., Loeffel, E. and Allen, D.: Proc. Soc. Exper. Biol. & Med. 43: 212-214 (1940).
McCawley, E.L. *See* Perry, I.H.
McChesney, E.W.: Proc. Soc. Exper. Biol. & Med. 57: 29-31 (1944).
McClosky, W.T., Lillie, R.D. and Smith, M.I.: J. Pharmacol. and Exper. Therap. 89: 125-130 (1947).
McClosky, W.T., Smith, M.I. and Lillie, R.D.: U.S. Pub. Health Rep. 60: 1101-1113 (1945).
McClosky, W.T. *See* Smith, M.I.
McClure, F.J. *See* Arnold, F.A., Jr.
McCluskie, J.A.W. and Niven, J.S.F.: J. Path. & Bact. 47: 155-157 (1938).
McConnell, G.: J.A.M.A. 49: 1498-1500 (1907).
McCord, C.P., Meek, S.F., Harrold, G.C. and Heussner, J.: Indust. Hyg. & Toxicol. 24: 243-254 (1942).
McCullagh, E.P. *See* Lewis, L.A.
McCulloch, E.C. *See* Nicholson, L.G.
MacDonald, A.M. and Robson, J.M.: J. Path. & Bact. 48: 95-98 (1939).
MacDonald, I.G.: Surg., Gynec. & Obst. 63: 138-144 (1936).
McDonald, S., Jr. and Woodhouse, D.L.: J. Path. & Bact. 47: 615-623 (1938).
McEndy, D.P., Boon, M.C. and Furth, J.: J. Nat. Cancer Inst. 3: 227-247 (1942).
McEuen, C.S. *See* Noble, R.L.
McGavak, T.H., Boyd, L.J., Terranova, R. and Lehr, D.: J. Indust. Hyg. Toxicol. 25: 98-111 (1943).
McGavak, T.H. *See* Vogel, M.
McIntire, J.M., Henderson, L.M., Schweigert, B.S. and Elvehjem, C.A.: Proc. Soc. Exper. Biol. and Med. 54: 98-100 (1943).
McIntosh, I.J. *See* Grimmett, R.E.R.
MacKay, E.M. *See* Addis, T.
MacKay, L.L. *See* Addis, T.
MacKenzie, C.G. *See* MacKenzie, J.B.
MacKenzie, J.B. and MacKenzie, C.G.: Bull. Johns Hopkins Hosp. 74: 85-97 (1944).
McKinney, S.E. *See* Mattis, P.A.
McNamara, B. *See* Bing, R.J.
McNaught, J.B., Beard, T.R. and De Eds, F.: Proc. Soc. Exper. Biol. & Med. 41: 17-20 (1939).
MacNider, W. de B. and Donnelly, G.L.: Proc. Soc. Exper. Biol. & Med. 29: 581-586 (1932).

Machle, W., Kitzmiller, K.V., Scott, E.W. and Treon, J.F.: J. Indust. Hyg. & Toxicol. 24: 222-225 (1942).
Machle, W. *See* Deichman, W.
Macola, B.A.: Rev. Soc. argent. de biol. 13: 105-111 (1937).
Madsen, M.E. *See* Dunning, W.F.
Magat, M.A., Abromowitsch, I.A. and Lebenson, E.G.: Med. Zhur. Akad. Nauk. USSR 11: 53-67 (1941).
Magnus, H.A.: Brit. Emp. Cancer Camp. 41st Ann. Rep. 27-28 (1937).
: J. Path. Bact. 49: 21-31 (1939).
Maisin, G. *See* Rusch, H.P.
Maisin, J.: Bull. Assoc. franç. p. l'étude du cancer 29: 6-23 (1940).
Maisin, J. and Coolen, M.L.: Compt. rend. Soc. de biol. 117: 109-111 (1934).
Maisin, J., Desmidt, P., and Jacqmin, L.: Compt. rend. Soc. de biol. 96: 1056-1058 (1927).
Maisin, J. and de Jonghe, A.: Compt. rend. Soc. de biol. 117: 111-114 (1934).
: Compt. rend. Soc. de biol. 123: 159-160 (1936).
Maisin, J. and Liégeois, P.: Compt. rend. Soc. de biol. 114: 536-538 (1933).
: Compt. rend. Soc. de biol. 115: 733-736 (1934).
Maisin, J. and Pourbaix, Y.: Rev. belge sc. med. 8: 1-45 (1936).
Maisin, J., Pourbaix, Y. and Caeymaex, P.: Compt. rend. Soc. de biol. 127: 1477-1478 (1938a).
: Compt. rend. Soc. de biol. 127: 1479-1481 (1938b).
Maisin, J., Pourbaix, Y. and Camerman, J.: Compt. rend. Soc. de biol. 128: 806-809 (1938c).
: Compt. rend. Soc. de biol. 130: 1381-1384 (1939a).
: Compt. rend. Soc. de biol. 132: 87-90 (1939b).
Maisin, J., Pourbaix, Y. and Cuvelier, E.: Compt. rend. Soc. de biol. 132: 315-318 (1939c).
Maisin, J., Pourbaix, Y. and Ceulemans, G.: Acta Biol. belge 1: 322-325 (1941).
Maisin, J., Pourbaix, Y. and Rijckaert, G.: Compt. rend. Soc. de biol. 130: 109-112 (1939d).
Maisin, J., Pourbaix, Y. and Van de Voorde, C.: Compt. rend. Soc. de biol. 132: 86-87 (1939e).
Maisin, J., Vassiliadis, H. and Godenir, A.: Compt. rend. Soc. de biol. 120: 259-261 (1935).
Maisin, J. *See* Bessemans, A.; Camerman, J.
Maisin, J.J. and Neeckmans, M.L.: Compt. rend. Soc. de biol. 151: 872-874 (1947).
Mameli, E.: Gazz. chim. ital. 67: 669-681 (1937).
Man, E.B. *See* Landauer, W.
Mann, F.C. *See* Bollman, J.L.
Manolescu-Motoc, F. *See* Craciun, E.C.
Mansilla, U.Q.: Publ. Med. Exper. Chile. 22: 7-13 (1943).
Manuel, S. *See* Chevallier, A.
Marine, D. and Baumann, E.J.: Arch. Path. 39: 325-330 (1945).
Marine, D. and Rosen, S.H.: Proc. Soc. Exper. Biol. & Med. 47: 61-62 (1941).
Marine, D. *See* Baumann, E.J.
Mark, J. and Biskind, G.R.: Endocrinology 28: 465-477 (1941).
Marron, T.U.: Proc. Soc. Exper. Biol. & Med. 48: 219-221 (1941).
Marsden, S.J. and Bird, H.R.: Poultry Science 26: 3-6 (1947).
Marsh, M. *See* Drinker, K.R.; Thompson, P.K.
Martin, A.W. *See* Krems, A.D.
Martin, R.H. *See* Badger, G.M.; Cook, J.W.
Martinez, B.A. *See* Houssay, B.A.
Maruya, H.: Osaka Igakkai Zassi 36: 527-528 (1937).
: Tr. Jap. Path. Soc. 28: 541-547 (1938).
: Gann 33: 203-205 (1939).
: Jap. J. M. Sc. V Path. 5: 83-105 (1940).
Maruya, H., Shimada, M. and Komatsu, K.: Gann 35: 277-280 (1941).
Maruya, H. and Tanaka, S.: Osaka Igakkai Zassi 35: 2304 (1936).
Maruya, H. and Yamasaki, S.: Gann 34: 181-182 (1940).
Maruya, H. *See* Mizutani, T.
Marx, H. *See* Arnold, O.
Marx, L. *See* Zondak, B.
Marx, R., Glass, S. and Skulman, A.: Am. J. Obstet. and Gynec. 44: 259-265 (1942).
Marx, W.: *See* Hecks, H.
Masayama, T., Iki, H., Yokoyama, T. and Hasimoto, M.: Gann 32: 303-306 (1938).
Masayama, T. and Yokayama, T.: Gann 34: 174-175 (1940).
Masayama, T., Yokayama, T. and Horii, K.: Gann 34: 187-188 (1940).
Masayama, T., Yokayama, T., Nakano, N. and Noda, K.: Gann 35: 300-301 (1941).
Matheu, C.P. *See* Laclau, N.C.
Mathews, J.A.: *See* Lightbody, H.I.
Matthews, C.S., Emery, F.E. and Schwabe, E.L.: Endocrinology 28: 761-764 (1941).

Matthews, C.S., Emery, F.E. and Weygandt, P.L.: Endocrinology 33: 177-180 (1943).
Matthews, C.S., Schwabe, E.L. and Emery, F.E.: Endocrinology 30: 89-92 (1942a).
: Growth 6: 7-22 (1942b).
Matthews, C.S. *See* Page, R.C.; Russell, H.K.
Mattis, P.A., Benson, W.M. and Koelle, E.S.: J. Pharmacol. 81: 116-132 (1944).
Mattis, P.A. *See* Welch, A.D.
Matolcsy, T.V.: Ztschr. f. Krebsforsch. 51: 344-348 (1941).
Mauro, V.: Folia Med. 25: 840-851 (1939).
Mawson, E.H.: *See* Boyland, E.
Max, P.F. *See* Paletta, F.X.
May, H. and Litzka, G.: Ztschr. f. Krebsforsch. 48: 376-383 (1939).
May, L.G., Moseley, R.W., Forbes, J.C.: Endocrinology 38: 147-151 (1946).
Mayer, D.T. *See* Bogart, R.
Mayer, E.: Endocrinology 40: 165-181 (1947).
Mayer, K. *See* Waldschmidt-Leitz, E.
Mayneord, W.V. and Parsons, L.D.: J. Path. Bact. 45: 35-48 (1937).
Mayneord, W.V. *See* Burrows, H.; Cook, J.W.
Mazer, C., Meranze, D.R. and Israel, S.L.: J.A.M.A. 105: 257-263 (1935).
Mazzoni, G.P. *See* Cottini, G.P.
Medes, G.: *See* Reimann, S.P.
Meek, S.F. *See* McCord, C.P.
Meisel, D. *See* Heiman, J.
Melchionna, R.H. *See* Moore, R.A.
Mello, R.F.: Proc. Soc. Exper. Biol. & Med. 55-56: 149-151 (1944).
: Rev. brasil. de biol.: 5: 1-31 (1945).
Mello, R.F. *See* Lipschütz, A.
Meltzer, S. *See* Cameron, A.T.
Meranze, D.R. *See* Mazer, C.
Meyer, H.L. *See* Nettleship, A.
Meyer, K.K. *See* Leonard, S.L.
Meyers, A.W.: Beitr. z. path. Anat. u. z. allg. Path. 46: 437-451 (1909).
Michalowsky, I.: Centralbl. f. allg. Path. u. path. Anat. 38: 585-587 (1926).
: Virchows Arch. f. path. Anat. 267: 27-62 (1928).
: Virchows Arch. f. path. Anat. 274: 319-325 (1929).
Micheel, F. and Emde, H.: Ztschr. f. physiol. chem. 266: 249-256 (1940).
: Ztschr. f. physiol. chem. 269: 217-226 (1941).
Mider, G.B. and Morton, J.J.: Am. J. Cancer 37: 355-363 (1939a).
: Am. J. Path. 15: 299-302 (1939b).
: Proc. Soc. Exper. Biol. & Med. 42: 583-584 (1939c).
: J. Nat. Cancer Inst. 1: 41-44 (1940).
Mider, G.B. and White, J.: Cancer Research 1: 734-735 (1941).
Mider, G.B. *See* Morton, J.J.; Shimkin, M.B.; White, J.
Miescher, G.: Schweiz. med. wchnschr. 72: 1082-1084 (1942).
Miescher, K.: Schweiz. med. Wchnschr. 67: 537-540 (1937a).
: Schweiz. med. Wchnschr. 67: 1046-1048 (1937b).
: Schweiz. med. Wchnschr. 68: 1345-1349 (1938).
Miescher, K., Fischer, W.H. and Tschopp, E.: Biochem. Ztschr. 300: 14-27 (1938a).
Miescher, K., Scholz, C. and Tschopp, E.: Schweiz. med. Wchnschr. 67: 268-269 (1937).
: Biochem. J. 32: 141-148 (1938b).
: Biochem. J. 32: 725-732 (1938c).
Miescher, K., Wettstein, A. and Tschopp, E.: Biochem. J. 30: 1977-1990 (1936).
Migliavacca, A.: Arch. f. Gynäk. 164: 463-477 (1937a).
: Tumori 23 (new ser. 11): 246-312 (1937b).
Mikhailov, B.M. and Blokhina, A.N.: J. Gen. chem. USSR. 10: 1793-1797 (1940).
Miletitch, D.L. *See* Chahovitch, X.
Miller, A.K.: J. Nutrition 29: 143-153 (1945).
Miller, E. *See* Eschenbrenner, A.B.
Miller, E.C. and Baumann, C.A.: Cancer Research 6: 289-295 (1946).
Miller, E.C., Baumann, C.A. and Rusch, H.P.: Cancer Research 5: 713-716 (1945).
Miller, E.C. *See* Miller, J.A.
Miller, E.W. and Pybus, F.C.: J. Path. & Bact. 54: 155-168 (1942).
Miller, E.W., Orr, J.W., and Pybus, F.C.: J. Path. & Bact. 55: 137-150 (1943).
Miller, E.W. *See* Pybus, F.C.
Miller, J.A. and Baumann, C.A.: Cancer Research 5: 227-234 (1945).
Miller, J.A., Kline, B.E., Rusch, H.P. and Baumann, C.A.: Cancer Research 4: 153-158 (1944a).
: Cancer Research 4: 756-761 (1944b).
Miller, J.A., Miller, E.C. and Baumann, C.A.: Cancer Research 5: 162-168 (1945).

Miller, J.A., Miner, D.L., Rusch, H.P. and Baumann, C.A.: Cancer Research 1: 699-708 (1941).
Miller, J.A. *See* Giese, J.E.; Kline, B.E.; Miner, D.L.
Miller, J.W. *See* Fairhall, L.T.; Fleming, R.B.L.; Werner, H.W.
Miller, W.T. and Williams, K.T.: J. Agr. Research 61: 353-368 (1940).
Mills, C.A. *See* Wallace, E.W.
Miner, D.L., Miller, J.A., Baumann, C.A. and Rusch, H.P.: Cancer Research 3: 296-302 (1943).
Miner, D.L. *See* Miller, J.A.
Miro-Quesada, O.: Rev. de med. Exper. 4: 18-25 (1945).
Mitchell, J.L. *See* Werner, H.W.
Miura, K.: Bull. Assoc. franç. p. l'étude du cancer 24: 534-538 (1935).
Miyake, S. and Araki, M.: Gann 35: 345-346 (1941).
Miyake, S. *See* Araki, M.
Miyamoto, S.: Tokyo Iji, S. 1: 3039- (1937).
: Strahlentherapie 64: 683-690 (1939).
Mizuta, T. and Maruya, H.: Osaka Igakkai Zassi 35: 1187 (1936).
Mizuta, T. and Nagasima, M.: Gann 34: 167-168 (1940).
Mizutani, T. and Maruya, H.: Osaka Igakkai Zassi 35: 1187 (1936).
Mochowski, L.D. *See* Horning, E.S.
Moehlig, R.C. and Jaffe, L.: J. Lab. and Clin. Med. 27: 1009-1012 (1942).
Molitor, H. and Robinson, H.J.: Proc. Soc. Exper. Biol. & Med. 43: 125-128 (1940).
Monaco, A.R. *See* Donahue, D.D.; Von Oettingen, W.F.
Montezemolo, R. *See* Serono, C.
Moore, C.R. and Morgan, C.F.: Endocrinology 30: 990-999 (1942).
Moore, C.R. and Price, D.: Am. J. Anat. 50: 13-71 (1932).
Moore, P.R. *See* Baumann, C.A.; Lavik, P.S.
Moore, R.A. and Melchionna, R.H.: Am. J. Cancer 30: 731-741 (1937a).
: Am. J. Path. 13: 659-660 (1937b).
Morehead, R.P., Fishmann, W.H. and Artom, C.: Am. J. Path. 21: 803-812 (1945).
Morelli, E.: Boll. lega ital. lotta contro cancro 10: 180-187 (1936).
: Tumori 14: 486-502 (1940).
Morelli, E. and Dansi, A.: Biochim. e terap. sper. 24: 432-436 (1937).
Biochem. e terap. sper. 27: 60-63 (1940).
Morelli, E. *See* Dansi, A.; Sempronj, A.
Morgan, C.F. *See* Moore, C.R.
Mori, K.: Gann 35: 86-105 (1941a).
: Gann 35: 106-113 (1941b).
: Gann 35: 121-125 (1941c).
: Gann 35: 311-313 (1941d).
Mori, K. and Nakahara, W.: Gann 34: 48-58 (1940a).
: Gann 34: 188-190 (1940b).
Mori, K. *See* Nakahara, W.
Moricard, R. and Cauchoix, J.: Compt. rend. Soc. de biol. 129: 556-558 (1938).
Morigami, S. and Kasiwabara, N.: Gann 35: 65-70 (1941).
Morigami, S., Nagashima, M. and Kashiwabara, N.: Gann 35: 307-310 (1941).
Morigami, S. and Nisimura, I.: Gann 34: 146-147 (1941).
Morigami, S. *See* Sato, H.
Morenskaya, L.S.: Arch. des sc. biol., Moscow 56: (3) 189-200 (1938).
: Arch. des sc. biol., Moscow 56 (3): 53-58 (1939).
: Arch. biol. nauk. 60: 100-101 (1940).
: Arch. biol. nauk. 62: 21-29 (1941).
Morrell, J.A. and Hart, G.W.: Endocrinology 29: 796-808 (1941a).
: Endocrinology 29: 809-816 (1941b).
: Endocrinology 29: 995-1002 (1941c).
Morrione, T.G.: J. Exper. Med. 85: 217-226 (1947).
Morris, H.J., Nelson, A.A. and Calvery, H.O.: J. Pharmacol. 74: 266-273 (1942).
Morris, H.J. and Wallace E.W.: J. Pharmacol. & Exper. Therap. 64: 411-419 (1938).
Morris, H.J. *See* Calvery, H.O.; Grant, R.L.; Morris, H.P.
Morris, H.P., Dubnik, C.S., and Dalton, A.J.: J. Nat. Cancer Inst., 7: 159-169 (1946).
Morris, H.P., Dubnik, C.S., Dunn, T.B. and Johnson, J.M.: Cancer Research 7: 730 (1947).
Morris, H.P., Laug, E.P., Morris, H.J. and Grant, R.L.: J. Pharmacol. & Exper. Therap. 64: 420-445 (1938).
Morris, H.P. *See* Dalton, A.J.; Laug, E.P.
Morse, A.H. *See* Van Wagenen, G.; Zuckerman, S.
Mortarotti, T.G. *See* Wilson, R.H.
Morton, A.A., Branch, C.F. and Clapp, D.B.: Am. J. Cancer 26: 754-760 (1936).
Morton, A.A., Clapp, D.B. and Branch, C.F.: Science 82: 134 (1935).
Morton, J.J., Luce-Clausen, E.M. and Mahoney, E.B.: Am. J. Roentgenol. 43: 896-898 (1940).
: Cancer Research 2: 256-260 (1942).
Morton, J.J. and Mider, G.B.: Science 87: 327-328 (1938).
: Proc. Soc. Exper. Biol. & Med. 41: 357-360 (1939).

: Pub. Health Rep. 55: 670-676 (1940).
: Cancer Research 1: 95-98 (1941).
Morton, J.J. *See* Mider, G.B.
Moser, P.: Arch. f. Exper. Path. u. Pharmakol. 196: 446-454 (1940).
Moseley, R.W. *See* May, L.G.
Moskop, M. *See* Loeb, L; Suntzeff, V.
Mottram, J.C.: Proc. Roy. Soc. Med. 29: 15-18 (1935).
: Am. J. Cancer 30: 746-748 (1937).
: Am. J. Cancer 32: 76-79 (1938).
: Proc. Roy. Soc., London, s.B. 128: 248-252 (1940).
: J. Path. & Bact. 56: 181-187 (1944a).
: J. Path. & Bact. 56: 391-402 (1944b).
: Brit. J. Exper. Path. 26: 1-4 (1945).
Mottram, J.C. *See* Doniach, I.
Mu, J.W. *See* Frazier, C.N.
Mueller, G.C. *See* Rusch, H.P.
Mulinos, M.G., Pomerantz, L. and Lojkin, M.E.: Am. J. Pharm. 115: 51-63 (1943).
Mulinos, M.J. *See* Kesten, H.D.
Mulligan, R.M.: Am. J. Path. 20: 865-873 (1944a).
: Proc. Soc. Exper. Biol. & Med. 57: 134-135 (1944b).
: Proc. Soc. Exper. Biol. & Med. 54: 21-22 (1943).
Mulligan, R.M., Neubuerger, K.T., Lucas, J.T. and Lewis, W.B.: Exper. Med. and Surg. 4: 7-19 (1946).
Mulliken, B. *See* Turner, J.C.
Murillo, R. *See* Lipschütz, A.
Murillo Costa, R.: Publ. Med. Exper. (Chile) No. 4: 44 (1940).
Murphy, J.B. and Sturm, E.: Cancer Research 1: 379-383 (1941a).
: Cancer Research 1: 477-483 (1941b).
: Cancer Research 6: 11-13 (1946).
Murphy, K.M., Schilling, W. and Emge, L.A.: Proc. Soc. Exper. Biol. & Med. 39: 298-299 (1938).
Murphy, K.M. *See* Davis, J.H.
Murray, E. and Steinkamm, E.: Arch. f. Gynäk, 164: 1-11 (1937).
Mushett, C.W. and Seigel, H.: Am. J. M. Sc. 209: 411 (1945).

N

Naegeli, T. and Lauche, A.: Deutsche med. Wchnschr. 57: 2166 (1931).
: Klin. Wchnschr. 11: 2029-2030 (1932).
: Klin. Wchnschr. 12: 1730-1731 (1933).
Nagao, N.: Gann 31: 335-339 (1937).
: Gann 32: 232-234 (1938).
: Proc. Imp. Acad., Japan 15: 321-325 (1939).
: Gann 34: 13-19 (1940a).
: Gann 35: 161-164 (1940b).
: Gann 35: 1-6 (1941a).
: Gann 35: 8-20 (1941b).
: Gann 35: 280-282 (1941c).
: Gann 35: 330-332 (1941d).
Nagao, N. and Hashimoto, T.: Gann 33: 196-198 (1939).
Nagao, N. *See* Nishiyama, Y.; Otsuka, I.; Sasaki, T.
Nagasima, M. *See* Mizuta, T.; Morigami, S.
Nagata, J.: Tr. Jap. Path. Soc. 26: 426-434 (1937).
Nagazawa, T.: Tr. Jap. Path. Soc. 26: 613-616 (1936).
Nagelschmidt, G. *See* King, E.J.
Nakahara, W. and Fujiwara, T.: Gann 31: 568-574 (1937a).
: Gann 31: 660-663 (1937b).
: Gann 32: 477-483 (1938).
Nakahara, W., Fujiwara, T. and Mori, K.: Gann 33: 57-65 (1939a).
Nakahara, W. and Mori, K.: Proc. Imp. Acad., Japan 15: 278-281 (1939).
: Gann 34: 143-145 (1940).
: Gann 35: 327 (1941b).
Nakahara, W., Mori, K. and Fujiwara, T.: Gann 32: 465-467 (1938).
: Gann 33: 13-17 (1939b).
: Gann 33: 241-243 (1939c).
: Gann 33: 406-427 (1939d).
: Gann 34: 406-427 (1940).
Nakahara, W. *See* Kishi, S.; Mori, K.
Nakamura, H., Yamada, M., Okamura, H., Yoday, Y., and Nishi, T.: Gann 32: 245-250 (1938).
Nakano, K.: Osaka Igaku Zasshi 36: 483 (1937).
: Gann 33: 192-193 (1939).
: Gann 35: 205-230 (1941a).
Nakano, K. *See* Masayama, T.
Nakazawa, T.: Hokuetsu Igaku Zasshi 50: 1222 (1935).
Narat, J.K.: J. Cancer Research 9: 135-147 (1925).
Nathanson, I.T. and Andervont, H.B.: Proc. Soc. Exper. Biol. & Med. 40: 421-422 (1939).
Natucci, G.: Arch. ital. di med. sper. 5: 529-544 (1939).
Natucci, G. and Dall'Armi, G.: Arch. ital. di med. sper. 4: 591-616 (1939).
Nawrocki, C.Z. *See* Werner, H.W.
Neal, P.A. *See* Heppel, L.A.

Necheles, H.: Personal communication reported in Kline, A.J. and Palmer, W.L., 1940.
Neiman, I.M.: Arch. des sc. biol., Moscow 51 (3): 69-79 (1938).
Neiman, I.M. and Sinai, A.J.: Byull. eksper. biol. i med. 19: 56-60 (1945).
Nelson, A.A., Draize, J.H., Woodard, G., Fitzhugh, O.G., Smith, R.R., Jr., and Calvery, H.O.: U.S. Pub. Health Rep. 59: 1009-1020 (1944).
Nelson, A.A., Fitzhugh, O.G. and Calvery, H.O.: Cancer Research 3: 230-236 (1943).
Nelson, A.A. *See* Draize, J.H.; Fitzhugh, O.G.; Morris, H.J.
Nelson, J.W. and Lyster, S.C.: J. Am. Pharm. A. 35: 89-94 (1946).
Nelson, V.E. *See* Sutton, W.R.
Nelson, W.O.: Anat. Rec. 68: 99-102 (1937).
: Endocrinology 24: 50-54 (1939).
: Yale J. Biol. & Med. 17: 217-228 (1944).
Nelson, W.O. *See* Barnes, R.O.; Weller, D.
Nettleship, A., Henshaw, P.S. and Meyer, H.L.: J. Nat. Cancer Inst. 4: 309-319 (1943).
Nemours, A. *See* Nemours-Auguste.
Nemours-Auguste *See* Huguenin, R.
Neubuerger, K.T. *See* Mulligan, R.M.
Neuman, I.M. *See* Neiman, I.M.
Newman, H.W. *See* Hanzlik, P.J.; Van Winkle, W., Jr.
Newman, M.S.: J. Am. Chem. Soc. 59: 1003-1006 (1937).
: J. Am. Chem. Soc. 60: 1141-1142 (1938a).
: J. Am. Chem. Soc. 60: 1168-1370 (1938b).
: J. Am. Chem. Soc. 62: 870-874 (1940).
Newman, M.S. and Joshel, L.M.: J. Am. Chem. Soc. 60: 485-488 (1938).
: J. Am. Chem. Soc. 62: 972-974 (1940).
Newman, M.S. and Orchin, M.: J. Am. Chem. Soc. 60: 586-589 (1938).
Newman, M.S. and Wise, P.H.: J. Am. Chem. Soc. 63: 2109-2111 (1941).
Nicholson, L.G. and McCulloch, E.C.: J. Am. Vet. M.A. 101: 205-209 (1942).
Nicod, J.L. and Regamey, J.: Bull. Assoc. franç. p. l'étude du cancer 27: 706-722 (1938).
Nicole, R.: Ztschr. f. krebsforsch. 43: 173-181 (1935).
Nieto, G. *See* Iglesias, R.
Nishi, T. *See* Nakamura, H.
Nishimura, I. *See* Morigami, S.; Satani, Y.
Nishiyama, Y.: Gann 29: 1-9 (1935a).
: Gann 29: 285-294 (1935b).
: Gann 30: 419-420 (1936).
: Gann 31: 223-225 (1937).
: Gann 32: 85-98 (1938).
Nishiyama, Y., Nagao, N. and Ueda, H.: Gann 33: 199-202 (1939).
Niven, J.S.F. *See* Browning, C.H.; McCluskie, J.A.W.
Noble, R.L.: Lancet 235: 192-195 (1938a).
: J. Physiol. 94: 177-183 (1938b).
: J. Endocrinol. 1: 128-141 (1939a).
: J. Endocrinol. 1: 216-229 (1939b).
Noble, R.L. and Collip, J.B.: Canad. M.A.J. 44: 1-5 (1941).
Noble, R.L., McEuen, C.S. and Collip, J.B.: Canad. M.A.J. 42: 413-417 (1940).
Noda, K.: *See* Masayama, T.
Nonaka, T.: Gann 32: 234-235 (1938).
: Gann 33: 244-245 (1939).
: Gann 34: 148-149 (1940).
Norton, S.G. *See* Shimkin, M.B.
Notik, L.U.: Bull. biol. et méd. expér. URSS 9: 507-509 (1940).
Núñez, C. *See* Lipschütz, A.
Nyka, W. *See* Lacassagne, A.

O

Oberling, C. and Guérin, M.: Bull. Assoc. franç. p. l'étude du cancer 22: 469-489 (1933).
: Rep. Proc. 3rd Internat. Congr. Microbiol. (1939) 337-338 (1940).
Oberling, C., Guérin, M. and Guérin, P.: Compt. rend. Soc. de biol. 123: 1152-1154 (1936a).
: Bull. Assoc. franç. p. l'étude du cancer 28:
Oberling, C., Guérin, P. and Guérin, M.: Compt. rend. Soc. de biol. 130: 417-419 (1939b).
Oberling, C., Guérin, P., Guérin, M., and Sannié, C.: Compt. rend. Soc. de biol. 130: 17-19 (1939c).
Oberling, Sannié, C., Guérin, M. and Guérin, P.: Bull. Assoc. Franç. p. l'étude du cancer 25: 156 (1936b).
: Leewen.-Ver. 4: 57 (1937) Not consulted in original. Summary in Cook and Kennaway, Am. J. Cancer 39: 545 (1940).
Oberling, C., Sannié, C., Guérin, P. and Guérin, M.: Compt. rend. Soc. de biol. 131: 455-457 (1939d).
Oberling, C. *See* Roussy, G.; Sannié, C.
Oestreicher, F.: Acta brev. Neerland. 9: 260-263 (1939).
Ohno, S. *See* Yamagiwa, K.
Ohta, T.: Gann 34: 156-158 (1940a).
: Gann 34: 186-187 (1940b).
Okamura, H. *See* Nakamura, H.

O'Neil, J.: *See* Carnes, W.H.
Onufrio, O.: Folia med. 24: 1245-1255 (1938).
Opie, E.L.: J. Exper. Med. 80: 219-230 (1944).
Orcutin, M. *See* Newman, M.S.
Orr, C.R., Popoff, G.D., Rosedale, R.S. and Stephenson, R.R.: Radiology 30: 370 (1938)
Orr, J.W.: Brit. J. Exper. Path. 16: 121-126 (1935).
: J. Path. & Bact. 42: 703-704 (1936).
: J. Path. & Bact. 44: 19-27 (1937).
: J. Path. & Bact. 46: 495-515 (1939).
: J. Path. & Bact. 49: 157-170 (1939).
: J. Path. & Bact. 50: 393-408 (1940).
: J. Path. & Bact. 55: 483-488 (1944).
: J. Path. & Bact. 58: 589-592 (1946).
: Brit. J. Cancer 1: 311-316 (1947a).
: Brit. J. Cancer 1: 316-322 (1947b).
Orr, J.W. and Polson, C.J.: Am. J. Cancer 32: 114-125 (1938).
Orr, J.W. and Stickland, L.H.: Biochem. J. 35: 479-487 (1941).
Orr, J.W. *See* Bonser, G.M.; Miller, E.W.
Orr, M.L. *See* Heppel, L.A.
Orten, J.M. *See* Levey, S.
Ostergard, R.P. *See* György, P.
Otsuka, I.: Gann 29: 209-212 (1935).
: Gann 32: 231-232 (1938).
Otsuka, I. and Sagao, N.: Gann 30: 561-564 (1936).
Otsuka, I. *See* Sasaki, T.
Ottaviano, G. and Pappalardo, P.: Boll. d. Soc. ital. di biol. sper. 22: 1082-1083, 1083-1085, 1085-1086 (1946).
Otto, A. *See* Schwarz, L.
Ovalle, A.: Rev. de med. y aliment. 70: 977-984 (1942).
Overholser, M.D. and Allen, E.: Surg., Gynec. & Obst. 60: 129-136 (1935).
: Proc. Soc. Exper. Biol. & Med. 30: 1322-1326 (1933).
Overholser, M.D. *See* Harsh, R.; Weller, D.
Owen, S.T.: J. Am. Pharm. A. (Scient. ed.) 30: 252-254 (1941).

P

Page, R.C.: Arch. Path. 26: 800-813 (1938).
Page, R.C., Russell, H.K., Schwabe, E.L., Matthews, C.S. and Emery, F.E.: Endocrinology 29: 230-239 (1941).
Page, R.C. *See* Russell, H.K.
Pagge, J.C.: Arch. Path. 42: 598-616 (1946).
Paillas, J.E. *See* Cornil, L.
Paletta, F.X. and Cowdry, E.V.: Am. J. Path. 18: 291-311 (1942).
Paletta, F.X., Cowdry, E.V. and Lischer, C.E.: Cancer Research 1: 942-952 (1941).
Paletta, F.X. and Max: J. Nat. Cancer Inst. 2: 577-581 (1942).
Paletta, F.X. *See* Cowdry, E.V.
Palma, J.: Public Med. exper. Chile 26 (1940).
: *See* Lipschütz, A.
Palmer, W.L. *See* Kline, A.J.
Pandolfini, R.: Arch. ed atti d. Soc. ital. di chir. 43: 911-922 (1937).
Pappalardo, P. *See* Ottaviano, G.
Pappenheimer, A.M. *See* Kaunitz, H.
Parhon, C.I. and Pitis, M.: Bull. et mem. Soc. Roumaine d'endocrinol. 5: 391-397 (1939).
Parkes, A.S. *See* Deanesly, R.; Zuckerman, S.
Parsons, L.D.: J. Path. & Bact. 43: 1-22 (1936).
: J. Path. & Bact. 47: 502-523 (1938).
: J. Path. & Bact. 54: 321-330 (1942).
Parsons, L.D. and Warren, F.L.: J. Path. & Bact. 52: 305-321 (1941).
Parsons, L.D. *See* Mayneord, W.V.
Paschkis, K.E. *See* Cantarow, A.; Rakoff, A.E.; Shay, H.
Patek, A.J. *See* Post, J.
Patty, F.A. *See* Sayers, R.R.
Paunz, L.: Ztschr. f. d. ges. exper. Med. 94: 507-510 (1934).
Peacock, P.R.: Cong. internat. de lucha cient. y Soc. contra el cancer, Madrid 2: 1427-1428 (1933a).
: J. Path. & Bact. 36: 141-152 (1933b).
: Proc. Roy. Soc., London, s.B. 113: 285-287 (1933c).
: Am. J. Cancer 25: 37-48 (1935a).
: Leeuw.-Vereen., Amsterdam (1935b).
Peacock, P.R. and Beck, S.: Brit. J. Exper. Path. 19: 315-319 (1938).
Peacock, P.R. and Kirby, A.H.M.: Cancer Research 4: 88-93 (1944).
Peacock, P.R. *See* Beck, S.; Kirby, A.H.M.
Pearce, S.J. *See* Sayers, R.R.
Pecco, A.: Tumori 17: 32-50 (1943).
Peers, J.H.: Am. J. Path. 15: 261-272 (1939).
: Am. J. Path. 16: 799-816 (1940).
Peisakhovich, I.M., Eingorn, G.L. and G.S. Voronjansky: Trudi Pervovo Syezda Onkologov USSR, Medgiz.Narkomzdrav, Moscow 27-31 (1940).
Peiser, R. *See* Ruschke, A.

Pencharz, R.I. *See* Lyons, W.R.
Pentimalli, E.: Sper. Arch. di biol. 80: 623-637 (1926).
Perlmann, S. and Staehler, W.: Klin. Wchnschr. 11: 1955-1956 (1932a).
: Ztschr. f. urol. Chir. 36: 139-164 (1932b).
: Ztschr. f. Urol. 27: 195-197 (1933).
Perloff, W.H. and Kurzrok, R.: Proc. Soc. Exper. Biol. & Med. 262-265 (1941).
Perrault, A. *See* Shear, M.J.
Perrin, T.L. *See* Heppel, L.A.
Perry, I.H.: Proc. Soc. Exper. Biol. & Med. 35: 325-326 (1936).
Perry, I.H. and Ginzton, L.L.: Am. J. Cancer 29: 680-704 (1937).
Perry, I.H. and Lockhead, M.S.: Am. J. Cancer 35: 422-429 (1939).
Perry, I.H., Strait, L.A. and McCawley, E.L.: Cancer Research 3: 378-384 (1943).
Persike, E.C. Jr.: Am. J. Physiol. 130: 384-391 (1940).
Peters, J.B. *See* Williams, R.H.
Pettigrew, F.W. *See* Riley, J.F.
Petroff, N. and Krotkina, N.: Bull. Assoc. franç. p. l'étude du cancer 17: 566-589 (1928).
: Ztschr. f. Krebsforsch. 38: 249-263 (1933).
Petrov, N. *See* Petroff, N.
Peyron, A. and Samsonoff, N.: Compt. rend. Soc. de biol. 135: 922-925 (1941).
Pfeiffer, C.A.: Endocrinology 41: 92-104 (1947).
Pfeiffer, C.A. and Allen, E.: Cancer Research 5: 589-590 (1945).
Pfeiffer, C.A., Emmel, V.M. and Gardner, W.U.: Yale J. Biol. & Med. 12: 493-501 (1940).
Pfeiffer, C.A. and Gardner, W.U.: Endocrinology 23: 485-491 (1938).
Pfeiffer, C.A. *See* Drill, V.A.; Gardner, W.U.; Hooker, C.W.; Landauer, W.
Phelps, D. *See* Cleveland, R.
Phillips, R.L. *See* Ely, J.O.
Picard, E. and Laduron, H.: Compt. rend. Soc. de biol. 115: 1739-1742 (1934a) 117: 838-840 (1934b).
Piemonte, M.: Tumori 24: 211-219 (1938).
Pierson, H.: Ztschr. f. Krebsforsch. 41: 103-138 (1934).
: Ztschr. f. Krebsforsch. 45: 1-27 (1936).
: Ztschr. f. Krebsforsch. 46: 109-129 (1937a).
: Ztschr. f. Krebsforsch. 47: 1-12 (1937b).
: Ztschr. f. Krebsforsch. 47: 336-340 (1938a).
: Ztschr. f. Krebsforsch. 48: 177-182 (1938b).
Pignatelli, G.: Pathologica 32: 273-279 (1940).
Pikovski, M. and Doljanski, L.: Harefuah 14: 63-65 (1938).
Pinzon, L.A.: Thesis, Santiago, Chile (1942).
Pirone-Naconelsctini, A.: *See* Veroni, G.
Pinto, A. *See* del Castillo, E.B.
Pisareva, T.A.: Voprosi Onkologii, Medgiz. Narkomzdrav, Moscow, 340-343 (1940).
Pisareva, T.A., Ber, L.S. and Sorin, J.E.: Trudi Pervovo Syezda Onkologov, USSR, Medgiz. Narkomzdrav, Moscow, 31-33 (1940).
Pisareva, T.A. *See* Voronjansky, G.S.
Pitis, M. *See* Parhon, C.I.
Pizzolato, P. and Beard, H.H.: Exper. Med. & Surg. 3: 95-99 (1945).
Plagge, J.C.: Arch. Path. 42: 598-606 (1946).
Pohle, E.A. and Ritchie, G.: Am. J. Roentgenol. 31: 512-519 (1934).
: Am. J. Roentgenol. 41: 950-953 (1939).
Polettini, B.: Boll. Soc. ital. biol. sper. 11: 951-953 (1936).
: Tumori 12: 101-113 (1938).
: Arch. "de Vecchi" per anat. pat. e med. clin. 3: 309-332 (1941a).
: Arch. med. sper. ital. 8: 65-76 (1941b).
: Bol. Soc. ital. biol. sper. 18: 52-54, 54-56 (1943).
Poling, E.C. *See* György, P.
Pollack, M.A. *See* Taylor, A.
Pollia, J.A.: J. Indust. Hyg. & Toxicol. 21: 219-220 (1939).
: J. Indust. Hyg. & Toxicol. 23: 449-451 (1941).
Polson, C.: J. Path. & Bact. 42: 537-538 (1936).
Polson, C.J. *See* Orr, J.W.
Pomerantz, L. *See* Kesten, H.D.; Mulinos, M.G.; Sutro, C.J.
Pomriaskinsky-Kobozieff, N. *See* Tchakhotine, S.
Popjak, G.: Biochem. J. 40: 608-621 (1946).
Popoff, G.D. *See* Orr, C.R.
Popper, H., György, P. and Goldblatt, H.: Arch. Path. 37: 161-168 (1944).
Porterfield, V.T. *See* Heppel, L.A.
Post, J., Earle, D.P., Jr. Patek, A.J., Jr. and Victor, J.: Am. J. Path. 18: 661-673 (1942).
Poth, E.J. and Knotts, F.L.: Proc. Soc. Exper. Biol. & Med. 48: 129-130 (1941).
Potter, V.R. *See* Rusch, H.P.
Poulson, O. *See* Engelbreth-Holm, J.
Poumeau-Delille, G. and Fabiani, J.: Compt. rend. Soc. de biol. 138: 238-239 (1944).

Pourbaix, Y. and Denisoff, N.: Compt. rend. Soc. de biol. 122: 128-130 (1936).
Pourbaix, Y. See Maisin, J.
Prado, J.L.: See Valle, J.R.
Premru, V. See Savnik, L.
Presco, A.: Rev. de med. y aliment. 6: 27-29 (1943).
Presho, E. See Hanzlik, P.J.
Price, D. See Moore, C.R.
Pritchard, E.A. See Fairhall, L.T.
Prodan, L.: J. Indust. Hyg. & Toxicol. 14: 174-196 (1932).
Prussia, G.: Sperimentale, Arch. di biol. 90: 522-539 (1936).
Puccinelli, E.: Pathologica. 23: 73-78 (1931).
Puck, T.T. See Robertson, O.H.
Pullinger, B.D.: J. Path. & Bact. 55: 301-309 (1943).
: J. Path. & Bact. 57: 467-476 (1945).
Purves, H.D. and Griesbach, W.E.: Brit. J. Exper. Path. 27: 294-297 (1946).
: Brit. J. Exper. Path. 28: 46-53 (1947).
Pybus, F.C. and Miller, E.W.: Nature, London 142: 872 (1938).
Pybus, F.C. See Miller, E.W.

Q

Quattrin, N.: Minerva med. 37: 149-151 (1946).
Queen, F.B. See Davenport, H.A.
Quintana, U., Lipschütz, A. and Bruzzone, S.: Rev. de med. y aliment. 6: 20-22 (1943).

R

Ragan, C. See Carnes, W.H.; Kuhlmann, D.
Raichle, K. See Windaus, A.
Rajewsky, B., Schraub, A. and Kahlau, G.: Naturwiss 31: 170-171 (1943).
Rake, G., Van Dyke, H.B. and Corwin, W.C.: Am. J. M. Sc. 200: 353-362 (1940).
Rakoff, A.S., Paschkis, K.E. and Cantarow, A.: Science 96: 322 (1942).
Rapisardi, S.: Riv. di pat. sper. 1: 383-384 (1926).
Raposo, L.S.: Compt. rend. Soc. de biol. 98: 86 (1928a).
Rardin, T.E. See Von Haam, E.
Rarei, B. and Engelhart, E.: Klin. Wchnschr. 19: 862 (1940).
Rarei, B. and Gummel, H.: Ztschr. f. Krebsforsch. 48: 355-365 (1939).
Rarei, B. See Druckrey, H.; Gummel, H.
Randall, H.T. See Haagensen, C.D.
Rask-Nielsen, R. See Engelbreth-Holm, J.
Ratschow, M. and Steckner, M.L.: Ztschr. f. Klin. med. 137: 576-590 (1940).
Rausch, E.O. See Astwood, E.B.
Ravenna, P.: Arch. per le sc. med. 57: 73-150 (1933).
Raynaud, A.: Compt. rend. Soc. de biol. 126: 215-218 (1937).
Raynaud, A. See Lacassagne, A.
Rechenberger, J. See Schairer, E.
Rechnitz, K. See Szarka, A.
Reese, J.D. See Wainman, P.
Regamey, J.: Bull. Soc. vaud. sc. nat. 59: 487-494 (1937).
: Bull. Soc. vaud. sc. nat. 62: 31-50 (1942).
Regamey, J. See Nicod, J.L.
Regan, J.F. See Barnes, B.O.
Regiani, M. See Bansi, A.
Reimann, S.P.: Protoplasma 10: 82-83 (1930).
Reimann, S.P. and Hall, E.M.: Arch. Path. 22: 55-61 (1936).
Reimann, S.P., Stimson, A.K. and Medes, G.: Growth 7: 175-181 (1943).
Reinhard, M.C. and Candee, C.F.: Am. J. Cancer 26: 552-553 (1936).
Reller, H.C.: See Cooper, Z.K.
Rennhak, S. See Windaus, A.
Reynolds, C. and Burner, E.L.: Indust. Med. 12: 835-840 (1943).
Rhoads, C.P.: Letter to Dr. Paul A. Neal, Dec. 7, 1946.
: Bull. New York Acad. Med. 18: 53-64 (1942).
Rhoads, C.P. See Abels, J.C.; Burk, D.; Dobriner, K.; Kensler, C.J.; Sugiura, K.; du Vigneaud, V.
Richards, R.K. and Kueter, K.: Endocrinology 29: 990-994 (1941).
Richardson, A.P.: J. Pharmacol. & Exper. Therap. 70: 370-377 (1940).
Richter, C.P. and Clisby, K.H.: Proc. Soc. Exper. Biol. & Med. 48: 684-687 (1941).
: Arch. Path. 33: 46-57 (1942).
Richter, C.P. See Dieke, S.H.
Richter, R. See Druckrey, H.
Riesco Undurraga, A.: Bol. Soc. chilena de obstet. y ginec. 11: 7-14 (1946).
Riesco, A.: Rev. de med. y aliment. 6: 27-29 (1943-44).
Riesco, A. See Lipschütz, A.
Rijckaert, G. See Maisin, J.
Riley, J.F. and Pettigrew, F.: Cancer Research 4: 502-504 (1944).
: Brit. J. Exper. Path. 26: 63-66 (1945).

Riley, J.F. and Wallace, A.R.: Brit. J. Exper. Path. 22: 24-28 (1941).
Rindone, G.: Lo sperimentale 98: 421-514 (1947).
Risi, A.: Arch. internat. de pharmacodyn. et de pharm. therap. 17: 118-127 (1937).
Ritchey, M.G. *See* Tatum, E.L.
Ritchie, G. *See* Pohle, E.A.
Robbins, E.B. *See* Scott, C.C.
Robertson, O.H., Loosli, C.G., Puck, T.T., Wise, H., Lemon, H.M. and Lester, W. Jr.: J. Pharmacol. & Exper. Therap. 91: 52-76 (1947).
Robertson, T.B.: J. Biol. Chem. 25: 635-646 (1916a).
: J. Biol. Chem. 25: 647-661 (1916b).
Robinson, (Mrs.) A.M. *See* Bachmann, W.E.; Badger, G.M.; Cook, J.W.
Robinson, E.J. *See* Benaglia, A.E.
Robinson, H. *See* Antopol, W.
Robinson, H.J. *See* Molitor, H.
Robson, J.M. and Bonser, G.M.: Nature, London 142: 836 (1938).
Robson, J.M. and Schönberg, A.: Nature 150: 22-23 (1942).
Robson, J.M., Schönberg, A. and Fahim, H.A.: Nature, London 142: 292-293 (1938).
Robson, J.M. *See* Bonser, G.M.; MacDonald, A.M.
Rocco, S.B.: Thesis Santiago, Chile; Publ. med. exper. Chile 14: 1-26 (1942).
Rodard, S. and Freed, S.C.: Endocrinology 30: 365-368 (1942).
Rodriguez, F.: Publ. med. exper. Chile 32 (1940).
Rodriguez, F., Lipschütz, A. and Vargas, L. Jr.: Lancet 238: 541-545 (1940).
Rodriguez, F. *See* Lipschütz, A.
Roe, E.M.F. *See* Boyland, E.; Burrows, H.; Haddow, A.
Roffo, A.H.: Bol. Inst. de med. exper. para el estud. y trat. del cancer 8: 277-334 (1931).
Rogers, N. *See* King, E.J.
Rohdenburg, G.L. *See* Bullock, F.D.
Rondoni, P. and Beltrami, W.: Enzymologia 3: 252-257 (1937).
: Tumori 25 (Ser. 11,13) 585-601 (1939).
Rondoni, P. and Corbellini, A.: Atti Accad. Lincei 21: 128-133 (1935).
: Tumori 22: (new ser. 10): 106-118 (1936).
Rosedale, R.S. *See* Orr, C.R.
Rosen, S.H. *See* Marine, D.
Rosenbaum, E.E. *See* Freed, S.C.
Rosenbohm, A. *See* Rosenbohm, L.
Rosenbohm, L. and Rosenbohm, A.: Ztschr. f. Krebsforsch. 53: 254-262 (1943).
Rosenstirn, J.: J. Cancer Research 10: 61-65 (1926).
Rosenthal, M. and Grace, E.J.: Am. J. M. Sc. 191: 607-618 (1936).
Ross, J.M.: J. Path. & Bact. 43: 267-276 (1936).
Ross, M.A. *See* Korenchevsky, V.
Rossner, W.: Ztschr. f. physiol. Chem. 249: 267-274 (1937).
Roth, J.A. and Ivy, A.C.: Gastroenterology 2: 274-285 (1944).
Rothbard, S. and Herman, J.R.: Arch. Path. 28: 212-222 (1939).
Rothenberg, M.S. *See* Cantarow, A.
Rothlin, E.: Schweiz. med. wchnschr. 74: 416-418 (1944).
Rothlin, E. and Gehlen, W.: Schweiz. med. Wchnschr. 71: 327-329 (1941).
Rothman, A.J. *See* Jones, R.F.
Rous, P. and Friedewald, W.F.: Science 94: 495-496 (1941).
Rous, P. *See* Friedewald, W.F.
Roussy, G. and Guérin, M.: Bull. Acad. de méd., Paris 123: 989-992 (1940).
: Presse Méd. 49: 761-763 (1941).
: Bull. Acad. de méd., Paris 130: 156-161 (1946).
: Compt. rend. Soc. de biol. 141: 93 (1947).
Roussy, G., Guérin, M. and Guérin, P.: Bull. Assoc. franç. p. l'étude du cancer 29: 252-259 (1940/41).
: Compt. rend. Soc. de biol. 136: 374-375 (1942a).
: Compt. rend. Soc. de biol. 136: 380-381 (1942b).
: Compt. rend. Soc. de biol. 215: 396-397 (1942c).
: Compt. rend. Soc. de biol. 137: 789-790 (1943a).
: Compt. rend. Soc. de biol. 216: 829-832 (1943b).
: Compt. rend. Soc. de biol. 138: 25-27 (1944a).
: Compt. rend. Soc. de biol. 218: 772-774 (1944b).
Roussy, G., Guérin, P. and Guérin, M.: Bull. Assoc. franç. p. l'étude du cancer 30: 66-73 (1942d).
Roussy, G., Oberling, C. and Guérin, M.: Bull. Acad. de méd., Paris 112: 809-816 (1934).
: Bull. Acad. de méd., Paris 25: 716-721 (1936a).
: Strahlentherapie 56: 160-167 (1936b).
Roussy, G., Oberling, C., Guérin, M. and Guérin, P.: Medycyna 694-696 (1939).
Rouyer, M. *See* Dobrovolskaia-Zavadskaia, N.
Rowley, E.M. *See* Selye, H.
Royer, R. *See* Lacassagne, A.
Rubinstein, H.S. and Kurland, A.A.: Endocrinology 28: 495-505 (1941).

Rubinstein, H.S. and Solomon, M.L.: Prod. Soc. Exper. Biol. & Med. 44: 442-443 (1940a).
: Proc. Soc. Exper. Biol. & Med. 45: 745-748 (1940b).
: Endocrinology 28: 112-114 (1941a).
: Endocrinology 28: 229-232 (1941b).
Rudali, G. Huu-Hoï, N.P., Lacassagne, A. and Lecocq, J.: Compt. rend. Soc. de biol. 140: 234-235 (1946).
Rudali, G. See Huu-Hoï, N.P.; Lacassagne, A.
Ruffilli, D.: Boll. Soc. ital. biol. sper. 17: 75-77 (1942).
Rupp, J.J.: See Bischoff, F.
Rusch, H.P., Baumann, C.A. and Maisin, G.L.: Arch. Path. 29: 8-19 (1940).
Rusch, H.P., Kline, B.E. and Baumann, C.A.: Cancer Research 2: 183-188 (1942).
Rusch, H.P., Mueller, G.C. and Kline, B.E.: Cancer Research 5: 565-571 (1945a).
Rusch, H.P., Potter, V.R. and Johnson, T.O.: Cancer Research 5: 584 (1945b).
Rusch, H.P. See Baumann, C.A.; Kline, B.E.; Miller, E.C.; Miner, D.L.; Lavik, P.S.
Russell, H.K.; Page, R.C., Matthews, C.S., Schwabe, K.L. and Emery, F.C.: Endocrinology 28: 897-906 (1941).
Russell, H.K. See Haddow, A.
Russell, H.K. See Page, R.C.
Russell, W.O.: Cancer Research 5: 140-151 (1945a).
: Cancer Research 5: 152-156 (1945b).
Russo, M. See Bansi, A.
Rutledge, E.K. See Hill, R.M.
Rutschinski, N.P.: Russkiy Vrach. 9: 794-797 (1910a).
: Russkiy Vrach. 9: 2081-2083 (1910b).
Ruz Orrego, V.O.: Publ. med exper. Chile 3: 1-33 (1939).
Ruz, O. See Lipschütz, A.

S

Saavedra, C.N.: Publ. Med. exper. Chile 8: 1-18 (1942).
Saberg, I. See Von Euler, H.
Sabin, F.R., Doan, C.A. and Yorkmer, C.E.: J. Exper. Med. 56: 287-290 (1932).
Saga, K. See Ishiwara, T.
Sabrazès, J., Rideau, J. and Geyer, A.: Gaz. hebd. Sc. med., Bordeaux 58: 531-537 (1937).
: Compt. rend. Soc. de biol. 127: 423-424 (1938).
Sako, Y. See Lyons, W.R.
Salaman, M.H.: J. Path. & Bact. 55: 381-382 (1943).
Salant, W. and Bengis, R.: J. Biol. Chem. 27: 403-427 (1916).
Salironi, E. See Bansi, A.
Sall, R.D. and Shear, M.J.: J. Nat. Cancer Inst. 1: 45-55 (1940).
Salmon, U.J. See Geist, S.H.; Walter, R.I.
Salter, W.T. See Craig, F.N.
Sammartino, R. and Arenas, N.: Compt. rend. Soc. de biol. 133: 321-323 (1940).
Sammartino, R. and Gandolfo Herrara, R.: Rev. med. Latinoam. 25: 976-977 (1940).
Sampson, J.R., Graham, R. and Hester, H.R.: Cornell Vet. 32: 225-236 (1942).
Sansonoff, N. See Peyron, A.
Samuels, L.T. See Ball, H.A.
Sannié, C., Oberling, C., Guérin, M. and Guérin, P.: Compt. rend. Soc. de biol. 120: 1196-1198 (1935).
Sannié, C. See Oberling, C.
Sarason, K.L.: Arch. Path. 35: 373-390 (1943).
Sorin, J.E. See Pisareva, T.A.
Sarnat, B.G. See Adams, C.O.
Sasaki, T.: Gann 29: 52-64 (1935).
Sasaki, T. and Nagao, N.: Proc. Imp. Acad. (Japan) 15: 156-164 (1939).
Sasaki, T., Nagao, N. and Otsuka, I.: Proc. Imp. Acad. (Tokyo) 16: 493-500 (1940b).
Sasaki, T., Nagao, N. and Ueda, H.: Proc. Imp. Acad. (Tokyo) 16: 486-492 (1940a).
Sasaki, T. and Yoshida, T.: Virchows Arch. f. path. Anat. 295: 175-200 (1935).
Satani, Y., Tanimura, T., Ishimura, I. and Isikawa, Y.: Gann 35: 275-276 (1941).
Sato, H. and Horigami, S.: Gann 35: 301-304 (1941).
Sato, S. See Yamazaki, J.
Satomi, M. See Yoshida, T.
Saunders, J.B. deC. M. See Lipman, M.N.
Savage, J.L. See Davenport, H.A.
Savnik, L. and Premru, V.: Ztschr. f. Krebsforsch. 51: 337-343 (1941).
Sayers, R.R., Yant, W.P., Schrenk, H.H., Chornyak, J., Pearce, S.J., Patty, F.A. and Linn, J.G.: J. Indust. Hyg. & Toxicol. 26: 255-259 (1944).
Schabad, L.M.: Arch. des sc. biol., Moscow 39: No. 1 753-767 (1935a).
: Ztschr. f. Krebsforsch. 42: 295-305 (1935b).
: Acta Union internat. contre cancer 3: 189-198 (1938a).
: Arch. des sc. biol., Moscow 51: No. 3: 112-119 (1938b).

Schabad, L.M. and Khaletskaia, F.M.: Arch. des sc. biol., Moscow 43: 75-88 (1936).
Schabad, L.M. and Urinson, J.P.: Arch. des sc. biol., Moscow 51: No. 3: 105-111 (1938).
Schabad, L.M. *See* Garschin, W.G.
Schachter, F. *See* Bauer, J.
Schairer, E.: Virchows Arch. f. path. Anat. 311: 149-164 (1943).
Schairer, E. and Rechenberger, J.: Klin. wchnschr. 21: 64 (1942).
Schar, W.: Le cancer 7: 205-214 (1930a).
: Deutsch. Ztschr. f. Chir. 226: 81-97 (1930b).
Schenken, J.R. and Burns, E.L.: Cancer Research 3: 693-696 (1943).
Schenken, J.R. *See* Burns, E.L.; Loeb, L.
Schiff, L. and Felson, H.: Am. J. Digest, Dis. 5: 292-294 (1938).
Schinz, H.R. and Uehlinger, E.: Ztschr. f. Krebsforsch. 52: 425-437 (1942).
Schiller, W.: Am. J. Cancer 31: 486-490 (1937).
Schilling, W. *See* Murphy, K.M.
Schmid, H.O.: Klin. Wchnschr. 16: 465 (1937a).
: Ztschr. f. Krebsforsch. 45: 335-346 (1937b).
Schmidt, I.G. *See* Schmidt, L.H.
Schmidt, L.H., Hughes, H.B., Badger, E.A. and Schmidt, I.G.: J. Pharmacol. & Exper. Therap. 81: 17-42 (1944).
Schmidt, M.B.: Virchows Arch. f. path. Anat. 253: 432-451 (1924).
Schober, B. *See* Burrows, H.
Schocke, H. *See* Lauber, H.J.
Schonberg, A. and Ghoneim, A.: Nature, London 157: 77 (1946).
Schönberg, A. *See* Robson, J.M.
Schoene, R.H. *See* Von Haam, E.
Schoental, R. *See* Berenblum, I.
Schogoleff, C. *See* Kaunitz, H.
Schon, K. *See* Winterstein, A.
Scholz, C. *See* Miescher, K.
Schraub, A. *See* Rajewsky, B.
Schreiber, B. *See* Koch, C.
Schreiber, G. *See* Koch, C.
Schreiber, L. and Wengler, F.: Centralbl. f. allg. Path. u. path. Anat. 19: 529-532 (1908).
Schrenk, H.H. *See* Sayers, R.R.
Schröder, J. *See* Benecke, E.
Schultz, F.H. *See* Hill, R.M.
Schürch, O.: Bull. Schweiz. Verein, f. Krebsbek. No. 3/4 (1936a).
: Ztschr. f. Krebsforsch. 45: 240-251 (1936b).
: Deutsche Ztschr. f. Chir. 252: 277-284 (1939a).
: Ztschr. f. Krebsforsch. 49: 353-362 (1939b).
Schürch, O. and Uehlinger, E.: Ztschr. f. Krebsforsch. 33: 476-484 (1931).
: Schweiz. med. Wchnschr. 64: 664-667 (1934).
: Arch. f. klin. Chir. 183: 704-719 (1935).
Schürch, O. *See* Uehlinger, E.
Schürch, O. and Winterstein, A.: Ztschr. f. physiol. Chem. 236: 79-91 (1935).
Schwabe, E.L. *See* Matthews, C.S.; Page, R.C.; Russell, H.K.
Schwartze, E.W. and Alsberg, C.L.: J. Pharmacol. & Exper. Therap. 21: 1-22 (1923).
Schwarz, J. *See* Lipschütz, A.
Schwarz, L. and Otto, A.: Ztschr. f. Hyg. u. Infektionskr. 104: 364-369 (1925).
Schweigert, B.S. *See* McIntire, J.M.
Scott, C.C., Chen, K.K., Kohlsteadt, K.G., Robbins, E.B. and Israel, F.W.: J. Pharmacol. & Exper. Therap. 91: 147-156 (1947).
Scott, C.M. *See* Haddow, A.
Scott, E.W. *See* Machle, W.
Scott, J.D. *See* Haddow, A.
Scudi, J.V. and Hamlin, M.T.: J. Pharmacol. & Exper. Therap. 8: 150-159 (1944).
Seager, L.D. and Castelnuovo, G.: Arch. Path. 44: 287-296 (1947).
Sebrell, W.H. *See* Ashburn, L.L.; Daft, F.S.; Kornberg, A.; Spicer, S.S.
Seelig, M.G.: Am. J. Cancer 20: 827-833 (1934).
Seelig, M.G. *See* Eckert, C.T.; Taussig, J.
Segal, H.L., Hodge, H.C., Watson, J.S., Jr. and Coates, G.: Gastroenterology 8: 199-201 (1947).
Segaloff, A.: Cancer Research 2: 794-796 (1942).
: Endocrinology 38: 26-29 (1946).
Segaloff, A. and Segaloff, A.: Endocrinology 34: 346-350 (1944).
Seidenfeld, M.A. and Hanzlik, P.J.: J. Pharmacol. 44: 109-121 (1932).
Seidenfeld, M.A. *See* Hanzlik, P.J.
Seifter, J.: J. Ind. Hyg. & Toxicol. 26: 250-252 (1944).
Seigel, H. *See* Mushett, C.W.
Selbie, F.R. *See* McIntosh, J.
Seligman, A.M., Shear, M.J. and Alexander, L.: Am. J. Cancer 37: 364-399 (1939).
Seligman, A.M. *See* Fieser, L.F.; Shear, M.J.
Selle, W.A., Brindley, P. and Spies, J.W.: Cancer Research 1: 618-619 (1941).

Selye, H.: Endocrinology 27: 657-660 (1940).
: Cancer Research 4: 349-351 (1944).
Selye, H., Collip, J.B. and Thomson, D.L.: Proc. Soc. Exper. Biol. & Med. 32: 1377-1381 (1935a).
Selye, H. and Friedman, S.: Endocrinology 28: 129-140 (1941).
Selye, H. and Hall, C.E.: Arch. Path. 36: 19-31 (1943).
Selye, H., Hall, C.E. and Rowley, E.M.: Canad. M.A.J. 49: 188-192 (1943).
: Proc. Soc. Exper. Biol. & Med. 54: 141-143 (1943).
Selye, H., Thomson, D.L. and Collip, J.B.: Nature 135: 65-66 (1935b).
Selye, H. *See* Bachmann, C.; McEuen, C.S.
Sempronj, A. and Morelli, E.: Am. J. Cancer 35: 534-537 (1939).
Sempronj, A. *See* Dansi, A.
Seyale, G.C., and Lacroix, L.: Pathologica 32: 473-500 (1940).
Shabad, L.M. *See* Schabad, L.M.
Shakhnovskaya, S.B.: Farmicol. Toxsicol. 7: 44-47 (1944).
Shay, H., Gershon-Cohen, J., Paschkis, K.E. and Fels, S.S.: Endocrinology 28: 485-494 (1941a).
: Endocrinology 28: 877-884 (1941b).
Shear, M.J.: Am. J. Cancer 26: 322-332 (1936a).
: Am. J. Cancer 28: 334-344 (1936b).
: Am. J. Cancer 29: 269-284 (1937a).
: Arch. Path. 23: 746-747 (1937b).
: Am. J. Cancer 33: 499-537 (1938a).
: 16th Internat. Physiol. Kong. 64-65 (1938b).
: J. Biol. Chem. 123: cviii-cix (1938c).
: Am. J. Cancer 36: 211-228 (1939).
Shear, M.J.: In Hartwell, J.L., "Survey of Compounds Which Have Been Tested for Carcinogenic Activity" Fed. Sec. Agency, 1941.
Shear, M.J. and Ilfeld, F.W.: Am. J. Path. 16: 287-293 (1940).
Shear, M.J. and Leiter, J.: J. Nat. Cancer Inst. 2: 99-113 (1941a).
: J. Nat. Cancer Inst. 2: 241-258 (1941b).
Shear, M.J. and Stewart, H.L.: In Hartwell, J.L., "Survey of Compounds Which Have Been Tested for Carcinogenic Activity" Fed. Sec. Agency, 1941.
Shear, M.J., Stewart, H.L. and Seligman, A.M.: J. Nat. Cancer Inst. 1: 291-302 (1940).
Shear, M.J. *See* Andervont, H.B.; Cabot, S.; Fieser, L.F.; Fishman, M.; Howe, P.R.; Jones, B.F.; Leiter, J.; Lorenz, E.; Sall, R.D.; Seligman, A.M.
Shigaunoff, G.C. *See* Wainman, P.
Shimada, M. *See* Maruya, H.
Shimauchi, T. *See* Yoshida, T.
Shimkin, M.B.: Am. J. Cancer 35: 538-542 (1939a).
: Pub. Health Rep. 54: 1388-1391 (1939b).
: Arch. Path. 29: 229-238 (1940a).
: Arch. Path. 29: 239-255 (1940b).
: J. Nat. Cancer Inst. 1: 761-765 (1941a).
: J. Pharmacol. & Exper. Therap. 61: 210-214 (1941b).
Shimkin, M.B. and Andervont, H.B.: Pub. Health Rep. 54: 2080-2085 (1939).
: J. Nat. Cancer Inst. 1: 57-62 (1940a).
: Pub. Health Rep. 55: 537-545 (1940b).
: J. Nat. Cancer Inst. 1: 599-605 (1941).
: J. Nat. Cancer Inst. 2: 611-622 (1942).
Shimkin, M.B. and Bryan, W.R.: J. Nat. Cancer Inst. 4: 25-35 (1943).
Shimkin, M.B. and Grady, H.G.: J. Nat. Cancer Inst. 1: 119-128 (1940a).
: Proc. Soc. Exper. Biol. & Med. 45: 246-248 (1940b).
: J. Nat. Cancer Inst. 2: 55-60 (1941a).
: J. Nat. Cancer Inst. 2: 61-63 (1941b).
Shimkin, M.B., Grady, H.G. and Andervont, H.B.: J. Nat. Cancer Inst. 2: 65-80 (1941).
Shimkin, M.B. and Leiter, J.: J. Nat. Cancer Inst. 1: 241-254 (1940).
Shimkin, M.B. and Lorenz, E.: J. Nat. Cancer Inst. 2: 499-510 (1942).
Shimkin, M.B., Lorenz, E., Wyman, R. and Norton, S.G.: Endocrinology 35: 283-295 (1944).
Shimkin, M.B. and Mider, G.B.: J. Nat. Cancer Inst. 1: 707-725 (1941a).
: Cancer Research 1: 751-752 (1941b).
Shimkin, M.B. and White, J.: Endocrinology 29: 1020-1025 (1941).
Shimkin, M.B. and Wyman, R.S.: J. Nat. Cancer Inst. 6: 187-189 (1945).
: J. Nat. Cancer Inst. 8: 49-52 (1947).
Shimkin, M.B. *See* Andervont, H.B.; Bryan, W.R.; Lorenz, E.
Shirota, S. *See* Araki, M.
Shogoleff, C. *See* Launitz, H.
Shrigley, E.W. *See* Duran-Reynals, F.
Shulman, A. *See* Marx, R.
Shumacker, H.B., Jr. and Lamont, A.: Proc. Soc. Exper. Biol. & Med. 32: 1568-1570 (1935).
Sicher, G. *See* Leuchtenberger, R.

Siegel, H. *See* Mushett, C.W.
Sierra, J.A.C.: Publ. med. exper. Chile 13: 1-28 (1942).
Silberberg, M. and Silberberg, R.: Arch. Path. 28: 340-360 (1939).
: Arch. Path. 31: 85-92 (1941a).
: Arch. Path. 32: 85-95 (1941b).
: Am. J. Path. 19: 839-853 (1943).
: Arch. Path. 39: 257-264 (1945a).
: Proc. Soc. Exper. Biol. & Med. 58: 347-348 (1945b).
: Arch. Path. 42: 193 (1946).
: Arch. Path. 43: 143-151 (1947a).
: Arch. Path. 44: 297-306 (1947b).
Silberberg, R. and Silberberg, M.: Arch. Path. 38: 215-219 (1944).
Silberberg, R. *See* Silberberg, M.
Silberman, S. *See* Lipschütz, A.
Silvani, A.G. *See* Dapra, L.
Silverstone, H. and Tannenbaum, A.: Cancer Research 7: 731 (1947).
Silverstroni, W.: Reale Accad. d'ital. class sci. fis. nat. 10: 1-46 (1939).
Simões Raposo, L. *See* Raposo, L.S.
Simpson, C.L. *See* Franseen, C.C.
Simpson, M.E., Kibrick, E.A., Becks, H. and Evans, H.M.: Endocrinology 30: 286-294 (1942).
Simpson, M.E. *See* Becks, H.; Evans, H.M.; Koneff, A.A.
Simpson, W.L., Carruthers, C., and Cramer, W.: Cancer Research 5: 1-4 (1945).
Simpson, W.L. and Cramer, W.: Cancer Research 3: 515-518 (1943a).
: Cancer Research 3: 604-605 (1943b).
: Cancer Research 5: 5-10 (1945a).
: Cancer Research 5: 449-463 (1945b).
Simpson, W.L. *See* Cramer, W.
Simsilevich, F. *See* Dobrovolskaia-Zavadskaia, N.
Sinai, A.J. *See* Neiman, I.M.
Skau, E.L. and Bergman, W.: J. Org. Chem. 3: 166-174 (1938).
Smith, A.H. *See* Levey, S.
Smith, D.L.; Wells, J.A. and D'Amour, F.E.: Cancer Research 2: 40-44 (1942).
Smith, G.M. *See* Bergmann, W.; Burr, H.S.; Gardner, W.U.; Strong, L.C.
Smith, M.I., Lillie, R.D. and Stohlman, E.F.: Pub. Health Rep. 58: 304-317 (1945).
Smith, M.I. and McClosky, W.T.: U.S. Pub. Health Rep. 60: 1129-1138 (1945).
Smith, M.I. and Stohlman, E.F.: U.S. Pub. Health Rep. 59: 984-993 (1944).
: U.S. Pub. Health Rep. 60: 289-301 (1945).
Smith, M.I. *See* Lillie, R.D.; McClosky, W.T.
Smith, P.E. *See* Engle, E.T.
Smith, P.K.: Am. J. M. Sc. 200: 83-84 (1940).
Smith, P.K., and Gardner, W.U.: Yale J. Biol. & Med. 11: 187-188 (1939).
Smith, P.K. *See* Wentworth, J.H.
Smith, R.B., Jr. *See* Draize, J.H.
Smyth, C.J. *See* Levey, S.
Snow, C.: J. Infect. Dis. 4: 385-396 (1907).
Snow, D.K. *See* Fieser, L.F.
Sober, E.K. *See* Cohen, P.P.
Soboleva, N.G.: Vestnik. Roentgen. i Radiol. 5: 191-198 (1927).
Soboleva, N.G. *See* Larionow, L.F.
Sollmann, T.: J. Pharmacol. & Exper. Therap. 24: 119-122 (1925).
Solomon, M.L. *See* Rubinstein, H.S.
Sorin, J.E.: Vaprosi Onkologii, Medgiz. Narkomzdrav, Moscow 348-350 (1940).
: See Pisareva, T.A.; Voronjansky, G.S.
Sosa Gallardo, J.B.: Rev. Soc. argent. de biol. 16: 118-128 (1940).
Soskin, S. *See* Freed, S.C.
Spangler, J.M. *See* Burk, D.; du Vigneaud, V.
Speert, H.: Science 92: 161-162 (1940).
Speert, H. *See* Hartman, C.G.
Spencer, J., D'Amour, F.E. and Gustavson, R.G.: Am. J. Anat. 50: 129-139 (1932).
Sperry, W.M. *See* Aranow, H. Jr.
Spicer, S.S., Daft, F.S., Sebrell, W.H. and Ashburn, L.L.: Pub. Health Rep. 57: 1559-1566 (1942).
Spicer, S.S. *See* Daft, F.S.
Spiegel, F. *See* Deichmann, W.
Spies, J.W. *See* Selle, W.A.
Spritzer, M. *See* Taschner, E.
Spurr, C.L.: Proc. Soc. Exper. Biol. & Med. 64: 259-261 (1947).
Staehler, W. *See* Perlman, S.
Stahr, H.: München. med. Wchnschr. 54: 1178-1179 (1907).
Stamer, S.: Acta path. et microbiol. Scandinav. Suppl. 47: 158 (1943a).
: Acta path. et microbiol. Scandinav. Suppl. 47: 160 (1943b).
: Acta path. et microbiol. Scandinav. 21: 632-639 (1944).

: Acta path. et microbiol. Scandinav. 22: 65-72 (1945)
Stamer, S. and Engelbreth-Holm, J.: Acta path. et microbiol. Scandinav. 20: 360-371 (1943a).
Stanley, A.J. *See* Walker, S.M.
Stasney, J. *See* Cantarow, A.
Stavely, H.E. *See* Bergmann, W.
Stebbins, R.B. and Blanchard, E.W.: Endocrinology 36: 305-312 (1945).
Stebbins, R.B. *See* Blanchard, E.W.
Steckner, M.L. *See* Ratschow, M.
Steele, R., Koch, F.C. and Steiner, P.E.: Cancer Research 1: 614-617 (1941).
Steele, R. *See* Steiner, P.E.
Stefu, L. *See* Craciun, E.C.
Steiner, P.E.: 3rd Internat. Cancer Cong. 138 (1939).
: Fed. Proc., Fed. Amer. Soc. Exper. Biol. 29th Meeting 185 (1942a).
: Arch. Path. 34: 613-624 (1942b).
Steiner, P.E., Steele, R. and Koch, F.C.: Cancer Research 3: 100-107 (1943).
Steiner, P.E. *See* Steele, R.
Stewart, H.L.: Am. J. Path. 15: 707-722 (1939a).
: Pub. Health Rep. 54: 1026-1031 (1939b).
: Arch. Path. 29: 153-162 (1940).
Stewart, H.L. and Lorenz, E.: J. Nat. Cancer Inst. 2: 193-196 (1941).
: J. Nat. Cancer Inst. 3: 175-189 (1942).
: Cancer Research 3: 123-124 (1943).
Stewart, H.L. *See* Fishman, M.; Grady, H.G.; Hartwell, J.L.; Lorenz, E.; Shear, M.J.; White, J.
Stickland, L.H. *See* Bonser, G.M.; Orr, J.W.
Stimson, A.K. *See* Reimann, S.P.
Stoeber, H.: München. med. Wchnschr. 56: 129-131 (1909).
Stoeber, H. and Wacker, L.: München. med. Wchnschr. 57: 947-950 (1910).
Stohlman, E.F. *See* Lillie, R.D.; Smith, M.I.
Stoland, O.O. *See* Boughton, L.L.
Stone, C.P.: Endocrinology 26: 511-515 (1940).
Stortebecker, T.P.: Skandinav. Arch. f. Physiol. 78: 268-271 (1938).
Storti, E. and Storti, R.: Arch. per le sc. med. 64: 221-232 (1937a).
: Klin. Wchnschr. 16: 1082-1085 (1937b).
: Le Sang 11: 749-753 (1937c).
Storti, R. *See* Storti, E.
Stowell, R.E.: J. Nat. Cancer Inst. 3: 111-121 (1942).
Stowell, R.E. and Cramer, W.: Cancer Research 2: 193-197 (1942a).
: Arch. Dermat. & Syph. 46: 276-282 (1942b).
Stowell, R.E. and Maas, L.C.: Cancer Research 6: 121-127 (1946).
Stowell, R.E. *See* Cramer, W.
Strait, L.A. *See* Perry, I.H.
Strömbeck, J.P.: J. Path. and Bact. 58: 275-278 (1946).
Strömbeck, J.P. *See* Ekman, B.
Strong, L.C.: Am. J. Cancer 39: 347-349 (1940).
: Arch. Path. 36: 58-63 (1943).
: Arch. Path. 37: 131-135 (1944).
: Arch. Path. 39: 232-236 (1945a).
: Cancer Research 5: 593 (1945b).
: Genetics 30: 26 (1945c).
: J. Nat. Cancer Inst. 5: 339-356 (1945d).
: Proc. Nat. Acad. Sc. 31: 290-293 (1945e).
: Proc. Soc. Exper. Biol. & Med. 59: 217-229 (1945f).
: Yale J. Biol. and Med. 18: 145 (1946).
Strong, L.C., Collins, V.J. and Durand, E.A.: Cancer Research 3: 21-28 (1943).
Strong, L.C. and Figge, F.H.J.: Cancer Research 6: 466-469 (1946).
Strong, L.C. and Hollander, W.F.: J. Nat. Cancer Inst. 8: 79-82 (1947).
Strong, L.C. and Smith, G.M.: Yale J. Biol. & Med. 11: 589-592 (1939).
Strong, L.C., Smith, G.M. and Gardner, W.U.: Yale J. Biol. & Med. 10: 335-346 (1938).
Strong, L.C. and Williams, W.L.: Cancer Research 1: 886-890 (1941).
Strong, L.C. *See* Bergmann, W.; Burdette, W.J.; Burr, H.S.; Collins, V.J.; Gardner, W.U.; Kirschbaum, A.
Sturm, E. *See* Murphy, J.B.
Sugiura, K.: Proc. Soc. Exper. Biol. & Med. 47: 17-19 (1941).
: Proc. Soc. Exper. Biol. & Med. 50: 214-215 (1942).
: Proc. Soc. Exper. Biol. & Med. 57: 231-234 (1944).
: Proc. Soc. Exper. Biol. & Med. 61: 301 (1946).
: Cancer Research 7: 732 (1947).
Sugiura, K., Halter, C.R., Kensler, C.J. and Rhoads, C.P.; Cancer Research 5: 235-238 (1945).
Sugiura, K. and Kensler, C.J.: Cancer Research 1: 745-746 (1941).

Sugiura, K., Kensler, C.J. and Rhoads, C.P.: Cancer Research 3: 130 (1943).
Sugiura, K. and Rhoads, C.P.: Cancer Research 1: 1-16 (1941).
: Cancer Research 2: 453-459 (1942).
Sugiura, K. *See* Burk, D.; Kensler, C.J.; du Vigneaud, V.
Sulman, F. and Black, R.: Endocrinology 36: 70 (1945).
Sumita, S.: Mitt. d. med. Gesellsch. zu Tokyo (or Tokyo Igakkwai Zassi) 49: 875-891 (1935).
Suntzeff, V., Babcock, R.S. and Loeb, L.: Am. J. Cancer 39: 56-60 (1940).
Suntzeff, V., Burns, E.L., Moskop, M. and Loeb, L.: Am. J. Cancer 27: 229-245 (1936).
: Am. J. Cancer 32: 256-289 (1938).
Suntzeff, V., Carruthers, C. and Cowdry, E.V.: Cancer Research 5: 512-515 (1945a).
: Cancer Research 5: 572-575 (1945b).
Suntzeff, V. *See* Burns, E.L.; Carruthers, C.; Cowdry, E.V.; Loeb, L.; Wicks, L.F.
Suramji, L.A. *See* Butenandt, A.
Sutro, C.J.: Proc. Soc. Exper. Biol. & Med. 44: 151-154 (1940).
Sutro, C.J. and Pomerantz, L.: Arch. Surg. 38: 1132-1149 (1939a).
: Arch. Surg. 39: 992-1000 (1939b).
: Arch. Path. 33: 305-311 (1942).
Sutton, W.R. and Nelson, V.E.: Proc. Soc. Exper. Biol. & Med. 36: 211-213 (1937).
Svirbely, J.C.; Dunn, R.C. and Von Oettingen, W.F.: J. Indust. Hyg. & Toxicol. 26: 37-46 (1944).
Swayne, V.R., Jr. *See* Fleming, R.B.L.
Sweeney, R.T. *See* Von Oettingen, W.F.
Sweet, W.H. and Bailey, P.: Arch. Neurol. & Psychiat. 45: 1047-1048 (1941).
Sykes, J.F., Davidson, J.A. and Barrett, F.N.: Poultry Science 24: 542-545 (1945).
Synder, R.K. *See* Von Oettingen, W.F.
Syverton, J.T., and Berry, G.P.: Science 91: 298 (1941).
Syverton, J.T., Berry, G.P. and Dascomb, H.E.: Cancer Research 2: 436-444 (1942).
Szabo, E.: Rev. chilena de hig. y med. prev. 3: 121-126 (1940a).
: Rev. Chilena de hig. y med. prev. 3: 127-134 (1940b).
Szabo, *See* Egãna, E.; also Lipschütz, A.
Szarff, J. Influence du Magnésium et du Potassium sur la Cancérisation expérimentale sur la Culture du Tissue Néoplasique. Thesis, Montpellier (1939). Abstract in Presse méd. 48: 69 (1940).
Szarka, A. and Rochnitz, K.: Klin. Wchnschr. 17: 538-540 (1938).

T

Takahashi, K.: Scient. Papers Inst. Phys. Chem. Research (Tokyo) 5: 103-132 (1926).
Takai, H.: Gann 35: 332-333 (1941).
Takaoka, K. *See* Araki, M.
Takeuchi, M.: Mit. med. Fak. Kais. Univ. Tokyo 20: 47-60 (1918).
Takizawa, N.: Gann 30: 429-433 (1936).
: Gann 32: 236-237 (1938).
: Gann 33: 193-195 (1939).
: Gann 34: 1-5 (1940a).
: Gann 34: 158-160 (1940b).
: Proc. Imp. Acad., Japan 16: 309-312 (1940c)
: Gann 35: 327-330 (1941).
Tanaka, S.: Osaka Igaku Zasshi, 35: 2303-2304 (1936).
: Gann 32: 275-277 (1938).
Tanaka, S. *See* Maruya, H.
Tanaseco, C. *See* Loeper, M.
Tanimura, T. *See* Satani, Y.
Tannenbaum, A.: Cancer Research 2: 460-467 (1942a)
: Cancer Research 2: 468-475 (1942).
: Cancer Research 4: 673-677 (1944a).
: Cancer Research 4: 683-687 (1944b).
: Cancer Research 5: 609-615 (1945a).
: Cancer Research 5: 616-625 (1945b).
Tannenbaum, A. *See* Silverstone, H.
Tanzi, B. *See* Gandolfi, C.
Tarr, H.L.A. and Carter, N.M.: J. Fisheries Res. Board Canada 6: 63-73 (1942).
Taschner, E., Gottlieb, G. and Spritzer, M.: Compt. rend. Soc. de biol. 124: 955-956 (1936).
Tatum, E.L., Ritchey, M.G., Cowdry, E.V. and Wicks, L.F.: J. Biol. Chem. 163: 675-682 (1946).
Tausk, M. and de Fremery, P.: Acta brev. Neerland. 5: 19-22 (1935).
Taussig, J., Cooper, Z.K. and Seelig, M.G.: Surg. Gynec. & Obst. 66: 989-993 (1938).
Taylor, A. and Pollack, M.A.: Cancer Research 2: 223-227 (1942).
Tchakhotine, S.: Compt. rend. Soc. de biol. 127: 415-418 (1938).
Tchakhotine, S. and Pomriaskinsky-Kobozieff, N.: Compt. rend. Soc. de biol. 127: 606-608 (1938).
Teague, R.S.: J. Pharmacol. & Exper. Therap. 75: 145-153 (1942).

Ten Seldam, R.E. *See* Visser, J.
Ten Thije, P.A. *See* Van Mervennee, C.J.
Teply, L.J. and Elvehjem, C.A.: Proc. Soc. Exper. Biol. & Med. 55: 59-61 (1944).
Terranova, R. *See* McGavak, T.H.
Thibaut, R. *See* Lipschütz, A.
Thomas, B.G.H. *See* Ansbacher, S.
Thomas, F. *See* Korteweg, R.
Thomas, G. *See* Deichmann, W.
Thomas, M.E. and Bruner, F.H.: Am. J. Roentgenol. 29: 641-662 (1933).
Thomas, J.A.: Compt. rend. Soc. de biol. 126: 1176-1178 (1937).
Thompson, P.K., Marsh, M. and Drinker, K.R.: Am. J. Physiol. 80: 65-74 (1927).
Thompson, P.K. *See* Drinker, K.R.
Thompson, W.D. *See* Carmichael, E.B.
Thomson, D.L. *See* Selye, H.
Tislowitz, R.: Acta Brev. Neerland. 9: 15-17 (1939a).
: Anat. Rec. 75: 265-274 (1939b)
Thornton, T.F., Jr. and Adams, W.E.: Cancer Research 4: 55-59 (1944).
Tietze, K.: Ztschr. f. Geburtsh. u. Gynäk. 108: 79-120 (1934).
Tjokronegoro, S. *See* Bonne, C.
Tokoro, Y.: Gann 34: 149-155 (1940).
Tomarelli, R. *See* György, P.
Tomita, T.: Gann 31: 225-232 (1937).
: Gann 32: 258-265 (1938).
: Gann 34: 182-185 (1940).
Tomita, T. *See* Amano, S.; Hayashi, I.
Tomkins, E.H.: Arch. Path. 35: 695-712 (1943).
Tramontano, V.: Pathologica 26: 157-180 (1934).
Treon, J.F. *See* Machle, W.
Tretyikova, R.Y.: Bull. Exper. Biol. & Med. 11: 496-500 (1941).
Trojaniello, A.: *See* De Luca, G.
Tschetter, D. *See* Brunschwig, A.
Tschopp, E. *See* Miescher, K.
Truhaut, R.: Ann. Pharm. franç. 5: 619-623 (1947).
Tsubouti, G. and Furukawa, K.: Acta med. Nagasak. 1: 50 (1939).
Tsurusaki, H. *See* Yoshida, T.
Tuchmann, H.: Compt. rend. Soc. de biol. 122: 1239-1241 (1936).
Tuchmann, H. and Demay, M.: Compt. rend. Soc. de biol. 123: 686-690 (1936a).
: Compt. rend. Soc. de biol. 123: 1139-1141 (1936b).
Turner, C. W. and Gomez, E.T.: Dept. of Agr., Mo. Agr. Expt. Sta. Research Bull. No. 206, 11 (1934).
Turner, C.W. *See* Gomez, E.T.; Lewis, A.A.
Turner, F.C.: Pub. Health Rep. 54: 1603-1609 (1939a).
: Pub. Health Rep. 54: 1855-1863 (1939b).
Turner, H.H., Lachmann, E. and Hellbaum, A.A.: Endocrinology 29: 425-429 (1941).
Turner, J.C. and Mulliken, B.: Proc. Soc. Exper. Biol. & Med. 49: 317-319 (1942).
Twombly, G.H.: Proc. Soc. Exper. Biol. 40: 430-432 (1939).
: Proc. Soc. Exper. Biol. & Med. 44: 617-618 (1940).
Twort, C.C. and Bottomley, A.C.: Lancet, 223: 776-780 (1932).
Twort, C.C. and Fulton, J.D.: J. Path & Bact. 33: 119-143 (1930).
Twort, C.C. and Ing, H.R.: Ztschr. f. Krebsforsch. 27: 306-351 (1928).
Twort, J.M and Lyth, R.: J. Hyg. 43: 252-255 (1944).
Twort, J.M. and Twort, C.C.: Am. J. Cancer 29: 78-92 (1937).
: Am. J. Cancer 35: 80-85 (1939).
Twort, C.C. *See* Bottomley, A.C.; Twort, J.M.
Tyslowitz, R. and Dingemanse, E.: Endocrinology 29: 817-827 (1941).
Tyslowitz, R. *See* Dingemanse, E.

U

Ueda, H. *See* Nishiyama, Y.; Sasaki, T.
Uehlinger, E. and Schürch, O.: Deutsch.Ztschr. f. Chir. 251: 12-33 (1938a).
: Schweiz. med. Wchnschr. 68: 860-861 (1938b).
Uehlinger, E. *See* Jadassohn, W.; Schinz, H.R.; Schürch, O.
Unna, K.: Proc. Soc. Exper. Biol. & Med. 54: 55-57 (1943).
Unna, K. *See* Antopol, W.
Urinson, J.P.: Sovet. vrach. zhur. 41: 264-270 (1937).
Urinson, J.P. *See* Schabad, L.M.
Ursu, A. *See* Craciun, E.C.
Utley, E. *See* Benaglia, A.E.

V

Vajano, D.: Arch. di radiol. 9: 57-145 (1933).
: Arch. di radiol. 11: 127-142 (1935).
Valade, P.: Bull. Assoc. franç. p. l'étude du cancer 26: 452-469 (1937a).
: Compt. rend. Acad. d. sc. 204: 1281-1282 (1937b).
: Bull. Assoc. franc. p. l'étude du cancer 27: 723-729 (1938).
Valle, J.R. and Prado, J.L.: Mem. Inst. Butantan. 19: 199-210 (1946).
Vander Brook, M.J. and Cartland, G.F.: J. Pharmacol. 80: 119-125 (1944).
Van der Schueren, G. and Vermeire, J.: Rev. belge Sc. med. 14: 42-47 (1942).
Van de Voorde, C. *See* Maisin, J.
Van Dyke, H.B. *See* Rake, G.
Van Gulik, R.J. and Korteweg, R.: Am. J. Cancer 38: 506-515 (1940).
Van Mervennee, C.J. and Ten Thije, P.A.: Nederl. tijdschr. v. geneesk. 83: 5622-5631 (1939).
Van Prohaska, J., Brunschwig, A. and Wilson, H.: Arch. Surg. 38: 328-333 (1939).
Van Veen, A.G. *See* Bonne, C.
Van Wagenen, G.: Anat. Rec. 63: 387-403 (1935a).
: Science 81: 366 (1935b).
Van Wagenen, G. and Folley, S.J.: J. Endocrinol. 1: 367-372 (1939).
Van Wagenen, G. and Morse, A.H.: Yale J. Biol. & Med. 17: 301-309 (1944).
Van Wagenen, G. *See* Gardner, W.U.
Van Winkle, W., Jr.: J. Pharmacol. & Exper. Therap. 72: 227-232 (1941).
Van Winkle, W., Jr. and Newman, H.W.: Food Research 6: 509-516 (1941).
Van Winkle, W., Jr. *See* Hanzlik, P.J.
Varco, R.L. *See* Hay, L.J.
Vargas, L. Jr.: Bull. Johns Hopkins Hosp. 73: 23-30 (1943a).
: Cancer Research 3: 309-317 (1943b).
: Rev. de med. y. aliment. 6: 53-55 (1943c).
Vargas, L. Jr., and Chaume, J.: Rev. Chilena de hig. y med. prev. 3: 135-140 (1940).
Vargas, L. Jr. and Lipschütz, A.: Compt. rend. Soc. de biol. 129: 810-813 (1938).
Vargas, L. Jr. *See* Jedlicky, A.; Koref, O.; Lipschütz, A.; Rodriguez, F.
Vassiliadis, H.: Compt. rend. Soc. de biol. 118: 1483-1485 (1935).
: Am. J. Cancer 39: 377-378 (1940).
Vassiliadis, H.C. *See* Maisin, J.
Vazquez-Lopez, E.: J. Path. & Bact. 56: 1-13 (1944).
: Nature, London 156: 296-297 (1945).
Veldstra, H.: Nature, London 144: 246-247 (1939).
Velling, E.I.: Farmekol. Toksikol. 6: 61-65 (1943).
Velluz, L.: Compt. rend. Acad. d. sc. 206: 1514-1516 (1938).
Veno, F. *See* Itoh, M.
Vera, O. *See* Lipschütz, A.
Vermeire, J.: *See* Van der Schueren, G.
Veroni, G. and Pirone-Naconelsctini, A.: Tumori 17: 51-62 (1943).
Vest, S.A., Drew, J.E. and Langworthy, O.R.: Endocrinology 28: 257-262 (1941).
: Endocrinology 27: 455-460 (1940).
Vetter, H. *See* Winterstein, A.
Vichnjitch, M. *See* Chahovitch, X.
Victor, J. *See* Post, J.
Vierthaler, R. *See* Druckrey, H.
Visser, J. and Ten Seldam, R.E.: Geneesk. tijdschr. v. Nederl.-Indië 78: 3280-3291 (1938).
Vivino, A.E. and Koppanyi, T.: J. Am. Pharm. A. 35: 169-173 (1946).
Vogel, M. and McGavack, T.H.: J. Pharmacol. and Exper. Therap. 86: 120-128 (1946).
Von Haam, E., Hammel, M.A., Bardin, T.E. and Schoene, R.H.: Endocrinology 28: 263-273 (1941).
Von Oettingen, W.F., Donahue, D.D., Snyder, R.K., Sweeney, R.T. and Monaco, A.R.: Nat. Inst. Health Bull. 285: 1-5 (1944).
Von Oettingen, W.F. *See* Svirbely, J.C.; Werner, H.W.; Wiley, F.H.
Von Wattenwyl, H.: Schweiz. med. wchnschr. 71: 1331-1334 (1941).
Voronjansky, G.S., Pisareva, T.A. and Sorin, J.E.: Arch. des sc. biol., Moscow 55: No. 2: 89-97 (1939).
Voronjansky, G.S. *See* Peisakhovich, I.M.
Vrla, V.L. *See* Lauter, W.M.
Vylegjanin, N.I.: Byull. eksper. biol. i med. 20: 3-6 (1945).

W

Wacker, L. and Hueck, W.: Arch. Exper. Path. u. Pharmakol. 74: 416-441 (1913).
Wacker, L. *See* Stoeber, H.
Wade, N.J.: J. Biol. Chem. 105: xcvi-xcvii (1934).

Wagner-Jauregg, T. and Koch, J.: Ztschr. f. Naturforschung 26: 14-19 (1947).
Wainman, L.M. *See* Bonser, G.M.
Wainman, P. and Shipounoff, G.C.: Endocrinology 29: 975-978 (1941).
Wainman, P., Reese, J.D. and Koneff, A.A.: Endocrinology 31: 303-308 (1942).
Wald, M.H. *See* Lindberg, H.A.
Waldo, C.M. *See* Wislocki, G.B.
Waldschmidt-Leitz, E., Hatschek, R. and Hausmann, R.: Ztschr. f. physiol. Chem. 267: 79-90 (1941).
Waldschmidt-Leitz, E., Mayer, K. and Hatschek, R.: Ztschr. f. physiol. chem. 263, I-III (1940).
Walker, S.M. and Stanley, A.J.: Proc. Soc. Exper. Biol. & Med. 48: 50-53 (1941).
Wall, E.M. *See* Grimmett, R.E.R.
Wallace, A.B. *See* Riley, J.F.
Wallace, E.W., Wallace, H.M. and Mills, C.A.: J. Nat. Cancer Inst. 3: 99-110 (1942).
Wallace, E.W. *See* Morris, H.J.
Wallace, H.M. *See* Wallace E.W.
Walter, R.I., Geist, S.H. and Salmon, U.J.: Proc. Soc. Exper. Biol. & Med. 44: 314-318 (1940).
Walter, R.I. *See* Geist, S.H.
Wangenstein, O.H. *See* Hay, L.J.
Ware, A.G. *See* Hill, R.M.
Warren, F.L. *See* Boyland, E.; Elson, L.A.; Kennaway, E.L.; Parsons, L.D.
Warren, S. and Gates, O.: Cancer Research 1: 65-68 (1941).
Warren, S. *See* Dunlap, C.E.
Watanabe, S.: Tr. Jap. Path. Soc. 27: 421-426 (1937).
Waterman, N.: Acta Cancrologica 2: 375-388 (1936).
: Acta brevia Neerl. 7: 18-20 (1937a).
: Nederl. tijdschr. v. geneesk. 81: 1273-1275 (1937b).
: Bull. Assoc. franç. p. l'étude du cancer 29: 70-76 (1940).
Waters, L.L.: Yale J. Biol. & Med. 10: 179-184 (1937).
Watson, J.S., Jr. *See* Segal, H.L.
Weatherby, J.H. and Haag, H.B.: J. Am. Pharm. A.: 27: 466-471 (1938).
Weatherby, J.H. and Williams, G.Z.: J. Am. Pharm. A. 28: 12-17 (1939).
Weichert, C.K. *See* Hale, H.B.
Weil, A.: Arch. Path. 26: 777-790 (1938a).
: Proc. Inst. Med. Chicago 12: 138 (1938b).
Weil, A. and Blumklotz, B.: J. Neuropath. & Exper. Neurol. 2: 34-44 (1943).
Weil, A. and Hetherington, A.W.: J. Mt. Sinai. Hosp. 9: 842-849 (1942).
Weil-Malherbe, H. and Dickens, F.: Cancer Research 4: 425-429 (1944).
: Cancer Research 6: 171-178 (1946).
Weil-Malherbe, H. *See* Dickens, F.
Weinglass, A.R. *See* Williams, R.H.
Weiner, A.E. *See* Brues, A.M.
Welch, A.D., Mattis, P.A. and Latven, A.R.: J. Pharmacol. & Exper. Therap. 75: 231-246 (1942).
Weller, D., Overholser, M.D. and Nelson, W.O.: Anat. Rec. 65: 149-163 (1936).
Wells, J.A. *See* Smith, D.L.
Wells, L.J. *See* Harsh, R.
Wengler, F. *See* Schreiber, L.
Werner, A.A. and Collier, W.I.: J. A.M. A. 100: 633-640 (1933a).
101: 1466-1471 (1933b)
Werner, H.W., Mitchell, J.L., Miller, J.W. and Von Oettingen, W.F.: J. Indust. Hyg. & Toxicol. 25: 409-414 (1943b)
Werner, H.W., Nawrocki, C.Z., Mitchell, J.L., Miller, J.W. and Von Oettingen, W.F.: J. Indust. Hyg. & Toxicol. 25: 374-379 (1943a).
Wessely, K.: Ber. ü. d. Versamml. d. deutsch. ophth. Gesellsch. 251-255 (1908).
West, H.D.: Proc. Soc. Exper. Biol. & Med. 43: 373-374 (1940).
West, H.D. and Jefferson, N.C.: J. Nutrition 23: 425-430 (1942).
Westphal, U.: Ztschr. f. physiol. chem. 281: 89-93 (1944).
Wettstein, A. *See* Miescher, K.
Wetzler-Ligeti, C. *See* Csato, T.
Weygandt, L. *See* Matthews, C.S.
Weyl, T.: The Coal-Tar Colors (1892).
White, A.: Yale J. Biol. & Med. 13: 759-768 (1941).
White, A. and White, J.: Yale J. Biol. & Med. 12: 427-431 (1940).
White, A. *See* White, J.
White, C.P.: J. Path. & Bact. 14: 145 (1909).
: J. Path. & Bact. 14: 450-462 (1910).
White, E.G.: J. Path. & Bact. 49: 95-103 (1939).
White, F.R. and Eschenbrenner, A.B.: Cancer Research 5: 594 (1945a).
: J. Nat. Cancer Inst. 6: 19-20 (1945b).
White, F.R. and White, J.: J. Nat. Cancer Inst. 4: 413-415 (1944).
White, F.R., White, J., Mider, G.B., Kelly, M.G. and Heston, W.E.: J. Nat. Cancer Inst. 5: 43-48 (1944).

White, J.: J. Nat. Cancer Inst. 1: 337-341 (1941).
White, J. and Edwards, J.E.: J. Nat. Cancer Inst. 2: 531-533 (1942a).
: J. Nat. Cancer Inst. 2: 535-538 (1942b).
: J. Nat. Cancer Inst. 3: 43-59 (1942c).
: Fed. Proc., Fed. Amer. Soc. Exper. Biol. 29th meeting, 140-144 (1942d).
White, J. and Mider, G.B.: J. Nat. Cancer Inst. 2: 95-97 (1941).
White, J., Mider, G.B. and Heston, W.E.: J. Nat. Cancer Inst. 4: 409-411 (1944).
White, J. and Stewart, H.L.: J. Nat. Cancer Inst. 3: 331-347 (1942).
White, J. and White, A.: J. Biol. Chem. 131: 149-161 (1939).
White, J. *See* Edwards, J.E.; Mider, G.B.; Shimkin, M.B.; White, A.; White, F.R.
Wicks, L.F. and Suntzeff, V.: Cancer Research 5: 464-468 (1945).
Wicks, L.F. *See* Tatum, E.L.
Wiegand, E.J. *See* Ellis, F.W.
Wiesner, B.P. *See* Csato, T.
Wiley, F.H., Hueper, W.C. and Von Oettingen, W.F.: J. Indust. Hyg. & Toxicol. 18: 123-126 (1936).
Wiley, F.H. *See* Hueper, W.C.
Williams, G.Z., Cary, M.K. and Williams, J.T.: Virginia M. Monthly 69: 93-95 (1942).
Williams, G.Z. *See* Forbes, J.C.; Weatherby, J.H.
Williams, J.T. *See* Williams, G.Z.
Williams, K.T. *See* Miller, W.T.
Williams, P.C. *See* Dodds, E.C.
Williams, R.H., Weinglass, A.R., Bissell, G.W. and Peters, J.B.: Endocrinology 34: 317-328 (1944).
Williams, W.L., Gardner, W.U. and De Vita, J.: Endocrinology 38: 368-375 (1946).
Williams, W.L. and Strong, L.C.: Cancer Research 4: 11-17 (1944).
Williams, W.L. *See* Kirschbaum, A.; Strong, L.C.
Wilson, J.G., Hamilton, J.B. and Young, W.C.: Endocrinology 29: 784-789 (1941).
Wilson, J.G. *See* Wolfe, J.M.
Wilson, R.H. and De Eds, F.: Federation Proc. 5: 173-174 (1946a).
: Federation Proc. 5: 213 (1946b).
Wilson, R.H., De Eds, F. and Cox, A.J., Jr.: Cancer Research 1: 595-608 (1941a).
: J. Pharmacol. & Exper. Therap. 71: 222-235 (1941b).
: Cancer Research 7: 444-449 (1947a).
: Cancer Research 7: 453-458 (1947b).
Wilson, R.H., Mortarotti, T.G., Doxtader, E.K.: Proc. Soc. Exper. Biol. & Med. 64: 324-327 (1941c).
Windaus, A. and Rennhak, S.: Ztschr. f. physiol. Chem. 249: 256-266 (1937).
Windaus, A. and Raichle, K.: Ann. d. Chem. 537: 157-170 (1939).
Winter, I.C.: J. Biol. Chem. 124: 339-346 (1938).
Winterstein, A., Schön, K. and Vetter, H.: Ztschr. f. physiol. Chem. 230: 158-169 (1934).
Winterstein, A. *See* Schürch, O.
Wise, H. *See* Robertson, O.H.
Wise, P.H. *See* Newman, M.S.
Wislocki, G.B., Aub, J.C. and Waldo, C.M.: Endocrinology 40: 202-224 (1947).
Witherup, S. *See* Deichman, W.B.
Woglom, W.H.: Am. J. Cancer 32: 447-448 (1938).
: Am. J. Cancer 40: 321-323 (1940a).
: Am. J. Cancer 40: 429-430 (1940b).
: Cancer Research 5: 420-421 (1945).
Wolbach, S.B.: Am. J. Path. 13: 662-663 (1937).
Wolfe, H.D. *See* Hueper, W.C.
Wolfe, J.M.: Am. J. Physiol. 115: 665-669 (1936).
: Endocrinology 29: 969-974 (1941).
Wolfe, J.M. and Bryan, W.R.: Am. J. Cancer 36: 359-368 (1939).
Wolfe, J.M., Campbell, M. and Burch, J.C.: Proc. Soc. Exper. Biol. & Med. 29: 1263-1265 (1932).
Wolfe, J.M. and Hamilton, J.B.: Endocrinology 25: 572-584 (1939).
Wolfe, J.M., Wilson, J.G., and Hamilton, J.B.: Yale J. Biol. and Med. 17: 341-349 (1944).
Wolfe, J.M. and Wright, A.W.: Endocrinology 23: 200-210 (1938).
Wood, F.C. *See* Dunning, W.F.
Woodard, G. *See* Nelson, A.A.
Woodard, H.Q.: Cancer Research 3: 159-163 (1943).
Woodhouse, D.L. *See* Lasnitzki, A.; McDonald, S., Jr.
Woodruff, L.M.: Cancer Research 1: 367-370 (1941).
Woodward, G. *See* Draize, J.H.; Lusky, M.L.
Wooley, G.W. and Little, C.C.: Proc. Nat. Acad. Sc. 32: 239-240 (1946).
Wright, A.W. *See* Wolfe, J.M.
Wright, I.S. *See* Ludden, J.B.
Wyman, R.S. *See* Shimkin, M.B.

Y

Yamada, M. *See* Nakamura, H.
Yamagiwa, K. and Ohno, S.: Gann 12: 3-9 (1918a).
: Verhandl. d. jap. Gesellsch. 8: 249-252 (1918b).
Yamasaki, S. *See* Maruya, H.
Yamashita, S.: Gann 32: 266-274 (1938).
Yamazaki, J. and Sato, S.: J. Dermat. & Urol. 42: 332-342 (1937).
Yamine, D. *See* Lipschütz, A.
Yant, W.P. *See* Sayers, R.R.
Yao, M.: Osaka Igaku Zasshi 36: 1485 (1937).
Yoda, Y. *See* Nakamura, H.
Yokayama, T. *See* Masayama, T.
Yoshida, S. *See* Yosida, S.
Yoshida, T.: Tr. Jap. Path. Soc. 21: 159-162 (1931).
: Proc. Imp. Acad. Japan 8: 464-467 (1932a).
: Tokyo Igaku Zasshi 46: 2398 (1932b).
: Tr. Jap. Path. Soc. 22: 193-197 (1932c).
: Tr. Jap. Path. Soc. 22: 934-937 (1932d).
: Virchows Arch. f. path. Anat. 283: 29-40 (1932e).
: Tr. Jap. Path. Soc. 23: 636-638 (1933).
: Gann 28: 441-457 (1934a).
: Gann 28: 454-457 (1934b).
: Tr. Jap. Path. Soc. 24: 523-530 (1934c).
: Gann 29: 213-220 (1935a).
: Gann 29: 295-300 (1935b).
: Gann 29: 304-305 (1935c).
: Deutsche med. Wchnschr. 63: 712 (1937).
Yoshida, T., Satomi, M. and Tsurusaki, H.: Gann 25: 317-322 (1941b).
Yoshida, T., Shimauchi, T. and Kin, C.: Gann 35: 272-274 (1941a).
Yoshida, T. *See* Sasaki, T.
Yosida, S. *See* Hamaguti, I.
You, S.S. *See* Chu, J.P.
Young, F.G. *See* Griffiths, M.
Young, J.S.: J. Path. & Bact. 31: 265-275 (1928).
Young, N.F. *See* Kensler, C.J.
Young, W.C. *See* Wilson, J.G.
Yudina, N.D.: J. med. ukrain. (or med. zhur.) 7: 819-835 (1937).
: J. med. ukrain. (or med. zhur.) 8: 149-156 (1938a).
: J. med. ukrain. (or med. zhur.) 8: 625-631 (1938b).
Yun, I.S. and Kim, S.S.: Trans. Jap. Path. Soc. 28: 426-428 (1938).

Z

Zajdela, F. *See* Lacassagne, A.
Zamecnik, P.C. and Koletsky, S.: Proc. Soc. Exper. Biol. & Med. 42: 391-392 (1939).
Zañartu, J. *See* Lipschütz, A.
Zarattini, A.: Tumori 14: 77-84 (1940).
Zilberman, G.B.: Zh. Obshchei Chimii (J. Gen. Chem.), Moscow 7: 234-235 (1937).
Zimmerman, H.M. and Arnold, H.: Tr. Am. Neurol. A. 66: 191-193 (1940).
: Cancer Research 1: 919-938 (1941a).
: Tr. Am. Neurol. A. 67: 161-163 (1941b).
: Cancer Research 4: 98-101 (1944).
Zimmerman, H.M. *See* Arnold, H.
Zondek, B.: J. Exper. Med. 63: 789-794 (1936a).
: Lancet 230: 776-778 (1936b).
: Lancet 231: 842-847 (1936c).
: Am. J. Obst. & Gynec. 33: 979-988 (1937a).
: Folia clin. orient. 1: 1-36 (1937b).
: Am. J. Cancer 33: 555-559 (1938a).
: Lancet 234: 1107-1110 (1938b).
Zondek, B. and Marx, L.: Arch. internat. de pharmacodyn. et de thérap. 61: 77-91 (1939).
Zuckerman, S.: J. Obst. & Gynec. Brit. Emp. 44: 494-499 (1937a).
: Lancet 232: 435-437 (1937b).
: J. Anat. 72: 264-276 (1938a).
: Lancet 234: 1162 (1938b).
Zuckerman, S. and Morse, A.H.: Surg., Gynec. & Obst. 61: 15-19 (1935).
Zuckerman, S. and Parkes, A.S.: J. Anat. 72: 277-279 (1938).
: J. Endocrinol. 1: 430-439 (1939).
: J. Endocrinol. 2: 263-267 (1941).
Zuckerman, S. *See* Bourne, G.; Folley, S.J.
Zugravesco, I. *See* Craciun, E.C.
Zurhelle, E.: Arch. f. Dermat. u. Syph. 179: 543-572 (1939).
Zylberszac, S.: Le Cancer, Bruxelles 13: 82-92 (1936).
: Compt. rend. Soc. de biol. 125: 389-390 (1937).

INDEX OF COMPOUNDS

Numbers refer to compound not page numbers

Add. after a number refers to Addenda

Aceanthrene 505
4,10-Ace-1,2-benzanthracene 766
8,9-Ace-1,2-benzanthracene 767
Acenaphthanthracene 768
Acenaphthene 433
Acenaphthene choleic acid 434
Acenaphthylene 435
Acetaldehyde 105
4'-Acetamino-4-dimethylaminoazobenzene 950
4-Acetaminostilbene 210
Acetanilide 211
Acetic acid 106
Acetone 107
Acetophenetidin 212
Acetophenone 213
4'-Acetoxy-1,2-benzanthracene 506
1-Acetoxychrysene 507
9-Acetoxy-1,2,5,6-dibenzanthracene 769
4'-Acetoxy-2,3'-dimethylazobenzene 951
9-Acetoxy-10-methyl-1,2-benzanthracene 508
10-Acetoxymethyl-1,2-benzanthracene 509
10-Acetoxy-1',9-methylene-1,2-benzanthracene 770
Acetoxypregnenolone 1045
2-Acetylaminoanthracene 436
9-Acetylaminoanthracene 437
Acetylaminochrysene 510
6-Acetylaminochrysene 511
Acetyl-o-aminoazotoluene 952
2-Acetylaminofluorene 439
10-Acetyl-1,2-benzanthracene 512
2-Acetyl-3,4-benzphenanthrene 513
10-Acetyl-3,4-benzpyrene 771
5-Amino-3,4-benzpyrene 772
Acetyl-5-bromosalicylic acid 214
Acetylcholine 108
Acetyl-β-naphthylamine 386
Acetylphenothiazine 1155
Acetylsalicylic acid 215
Acetylsulfadiazine 1156
Acridine 1157
Acrolein 109
Adrenaline 216
Adenylic acid 1158
Aerosol-OT 110
Allantoin 1159
Alloxan 1160
10-Allyl-1,2-benzanthracene 514
N-Allyl-N'-(m-carboxyphenyl)-isothiourea, sodium salt 217
5-Allyl-5-Δ^2-cyclopentenylbarbituric acid, sodium salt 1161
5,5-Allyl-isopropylbarbituric acid, sodium salt 1162
Allyl isothiocyanate 111
5,5-Allyl-(1-methylbutyl)-barbituric acid, sodium salt 1163
Allyl thiourea 112
Amaranth ..... *See* Edicol Amaranth AS
2-Aminoanthracene 440
9-Aminoanthracene 441
p-Aminoazobenzene 953
4-Amino-1,2'-azonaphthalene 954
o-Aminoazotoluene 955
p-Aminoazotoluene 956
2'-Amino-4,5'-azotoluene .... *See* p-aminoazotoluene
4'-Amino-2,3'-azotoluene .... *See* o-aminoazotoluene
3-Amino-1,2-benzanthracene 515
5-Amino-1,2-benzanthracene 516
8-Amino-1,2-benzanthracene 517
10-Amino-1,2-benzanthracene 518
m-Aminobenzoic acid 218
x-Aminochrysene 519
y-Aminochrysene 520
9-Amino-1,2,5,6-dibenzanthracene 773
4'-Amino-4-dimethylaminoazobenzene 957
p-Aminodimethylaniline *See* dimethyl-p-phenylenediamine
4'-Amino-2,2'-dimethylazobenzene 958
4-Amino-2,3-dimethylazobenzene 959
6-Amino-3,4'-dimethylazobenzene 960
4'-Amino-2,3'-dimethylazoxybenzene 961
4-Aminodiphenylamine 219
2-Aminofluorene 442
3-Amino-10-methyl-1,2-benzanthracene 521
2-Amino-1-naphthol 387
3-Aminophenanthrene 443
Amino-20-methylcholanthrene 774

9-Aminophenanthrene 444
p-Aminophenol 220
2-Aminopyrene 522
Aminopyrine 1164
4-Aminostilbene 221
4'-Amino-2,4,2',6-tetramethylazobenzene 962
Ammonium paratungstate 1
Ammonium potassium selenide 2
Ammonium sulfamate 3
Amniotin ..... *See* Estrone
Amyl alcohol 113
5-n-Amyl-1,2-benzanthracene 523
10-n-Amyl-1,2-benzanthracene 524
N-Amyl-N-benzylcyclohexylamine 222
cis-Androstanediol 1046
Androstanediol-3α,17α 1047
Androstanediol-3β,17α 1048
Androstanol-17α-one-3 1049
Δ^5-trans-Androstenediol 1050
Androstenediol dipropionate 1051
Δ^4-Androstenedione-3,17 1052
Androstin ..... *See* Testosterone
Androsterone 1053
Anil 421 1165
Aniline 223
Aniline hydrochloride 224
Anol ..... *See* p-hydroxypropenylbenzene
Anthanthrene 924
1',2'-Anthra-1,2-anthracene 925
2',1'-Anthra-1,2-anthracene 926
Anthracene 445
Anthraindene 775
9-Anthranylanthracene ..... *See* 9,9'-dianthryl
β-Anthraquinoline 1166
β-Anthraquinoline methiodide 1167
Anthraquinone 446
Antimony 4
Antipyrine 1168
ANTU ..... *See* α-naphthylthiourea
Arsenic 5
Arsenic trioxide 6
Arsenious acid 7
Arsenious oxide ..... *See* arsenic trioxide
Arsenopyrite 8
Arsphenamine 225
Ascorbic acid 1169
2-Ascorbyl palmitate 1170
Aspirin ..... *See* acetylsalicylic acid
Atabrine 1171
Auramine, base 226
4'-Aza-1,2-benzanthracene .... *See* β-anthraquinoline
5-Aza-1,2-benzanthracene .. *See* naphtho-(1,2-g)-quinoline
4'-Aza-3,4-benzphenanthrene *See* naphtho-(1,2-f)-quinoline
1'-Aza-3,4-benzpyrene .... *See* 3(N),4-pyridinopyrene
1-Azachrysene ..... *See* naphtho-(2,1-f)-quinoline
1-Azaphenanthrene ..... *See* 5,6-benzoquinoline
Azobenzene 963
Azo Blue 964
1,1'-Azonaphthalene 965
1,2'-Azonaphthalene 966
2,2'-Azonaphthalene 967
2,3'-Azotoluene ..... *See* 2,3'-dimethylazobenzene
Azoxybenzene 968
o-Azoxytoluene 969
Benzedrine sulfate 228
Benzaldehyde 227
Benzal-p-aminoazobenzene 970
1,2-Benzanthracene 525
1,2-Benzanthracene-10-acetic acid 526
1,2-Benzanthracene-4'-acetic acid, ethyl ester 527
1,2-Benzanthracene-10-acetic acid methyl ester 528
1,2-Benzanthracene-5-acetic acid, sodium salt 529
1,2-Benzanthracene-10-acetic acid, sodium salt 530
1,2-Benzanthracene-10-aldehyde 531
1,2-Benzanthracene-5-carboxylic acid, sodium salt .. 532
1,2-Benzanthracene-10-carboxylic acid, sodium salt .. 533
1,2-Benzanthracene-9,10-endo-α,β-succinic acid, sodium salt 534
1,2-Benzanthracene-3-hydroxyacetic acid 535
1,2-Benzanthracene-4'-sulfonic acid, ethyl ester ... 536
1,2-Benzanthracene-4'-sulfonic acid, potassium salt . 537
1,2-Benzanthracene-4'-sulfonylchloride 538
1,2-Benzanthra-9,10-hydroquinone diacetate 539
10-Benzanthranyl-acetic acid, methyl ester ..... *See* 10-carbomethoxymethyl-1,2-benzanthracene
1,2-Benzanthra-9,10-quinone 540
Benzanthrene 541
1,9-Benzanthrone 542
1,2-Benzanthryl-3-carbamidoacetic acid 543
1,2-Benzanthryl-10-carbamidoacetic acid 544
1,2-Benzanthryl-10-carbamidoacetic acid, ethyl ester 545
ε-(1,2-Benzanthryl-3-carbamido)-caproic acid 546
(1,2-Benzanthryl-10-carbamido)-caproic acid 547
1,2-Benzanthryl-10-carbamido-ethanol 548
1,2-Benzanthryl-10-S-dl-cysteine 549
1,2-Benzanthryl-3-isocyanate 550
1,2-Benzanthryl-10-isocyanate 551

1,2-Benzanthryl-10-mercaptan 552
1,2-Benzanthryl-10-methyl-5-l-cysteine 553
1,2-Benzanthryl-10-methyl-mercaptan 554
3-(1,2-Benz-10-anthryl)-1,2-propyleneglycol dibenzoate . 555
10-(1,2-Benzanthryl)-triphenyl lead 556
2',3'-Benz-1,2-benzanthracene .....
..... *See* 2',3'-naphth-1,2-anthracene
1,2-Benzcarbazole 1172
15,16-Benzdehydrocholanthrene 927
Benzene 229
Benzene hexachloride 230
Benzerythrene 231
Benzestrol *See* 2,4-di(p-hydroxyphenyl)-3-ethylhexane
1,2-Benzfluorene ..... *See* chrysofluorene
3,4-Benzfluorene 557
Benzidine 232
Benzidine sulfate 233
3,4-Benzofluoranthrene 776
Benzogynoestryl ..... *See* estrone benzoate
Benzoic acid 234
Benzoquinone 235
5,6-Benzoquinoline 1173
4,5-Benz-10,11-(1',2'-naphtho)-chrysene 928
3,4-Benzphenanthrene 558
1,2-Benzpyrene 777
3,4-Benzpyrene 778
3,4-Benzpyrene-5-aldehyde 779
3,4-Benzpyrene-3',4'-dicarboxylic acid, potassium salt 780
3,4-Benzpyrene-3',4'-dicarboxylic acid, sodium salt. 781
3,4-Benzpyrene-3',4'-dicarboxylic anhydride 782
3,4-Benzpyrene picrate 783
3,4-Benzpyrene-5,8-quinone 784
3,4-Benzpyrene-sulfonic acid 785
8,8-Benzthiophanthrene 1174
10-Benzylacenaphthanthracene 786
Benzyl alcohol 236
10-Benzyl-1,2-benzanthracene 559
Benzyl mercaptan 237
Benzyl oleate 114
Benzyl thiourea 238
Biebrich Scarlet R ..... *See* Scarlet Red
Bilirubin 1175
9,10-Bisacetoxymethyl-1,2-benzanthracene 560
Bis(p-chlorophenyl)-methane 239
2,2-Bis(p-chlorophenyl)-1,1,1-trichloroethane 240
9,10-Bishydroxymethyl-1,2-benzanthracene 561
Bismarck brown 971
p-(Bis-phenylazo)-benzene 972
1,9,4,10-Bispyrimidino-anthrone 1177
1,9,5,10-Bispyrimidino-anthrone 1178
α-Bromobenzyl cyanide 241
5-Bromo-9,10-dimethyl-1,2-benzanthracene 562
4'-Bromo-7-methyl-8,9-ace-1,2-benzanthracene 787
Bufagin 1054
Bufotalin 1055
Bufotoxin 1056
Bulbocapnine 1176
Butisol sodium .....
See sec-Butyl ethyl barbituric acid, sodium salt
Butter yellow ..... *See* p-dimethylaminoazobenzene
Butyl alcohol 115
5-n-Butyl-1,2-benzanthracene 563
10-n-Butyl-1,2-Benzanthracene 564
n-Butyl carbamate 1330
Butyl carbitol *See* diethylene glycol mono-butyl ether
20-t-Butylcholanthrene 788
sec-Butyl ethyl barbituric acid, sodium salt 1179
n-Butyric acid 116
9-n-Butyrylamino-1,2,5,6-dibenzanthracene 789
Cadmium 9
Cadmium carbonate 10
Cadmium chloride 11
Cadmium oxide 12
Cadmium phosphate 13
Cadmium subsalicylate 14
Cadmium sulfate 15
Caffeine 1180
Calciferol (vitamin D_2) 388
Calcium arsenate 16
Calcium arsenite 17
Calcium chloride 18
Calcium gluconate 117
Cantharidine 1181
Capric acid 118
Carbazole 1182
Carbitol ..... *See* diethylene glycol monoethyl ether
"4'-Carbomethoxy-2,3'-dimethylazobenzene" .....
.. *See* 2,3'-dimethylazobenzene-4'-methylcarbonate
6-Carbomethoxy-10-methyl-1,2-benzanthracene 565
7-Carbomethoxy-10-methyl-1,2-benzanthracene 566
Carbon disulfide 120
Carbon tetrachloride 119
3-Carboxymethoxy-1,2-benzanthracene .....
.... *See* 1,2-benzanthracene-3-hydroxyacetic acid
6-Carboxy-10-methyl-1,2-benzanthracene .....
.. *See* 10-methyl-1,2-benzanthracene-6-carboxylic acid

Carotene 242
Catechol 243
Cephalin 121
Cerium 19
9-Cetyl-5,6-benzoflavin 1183
Cetyl pyridinium chloride 1184
Chloracetone 122
Chloral hydrate 123
Chloralose 124
ω-Chloroacetophenone 244
Chloracetyl-o-aminoazotoluene 973
β-Chloroethyl carbamate 1331
4'-Chloro-2,3'-dimethylazobenzene 974
6-Chloro-9-ethyl-1,2-benzacridine 1185
2-Chlorofluorene 447
Chloroform 125
5-Chloro-10-methyl-1,2-benzanthracene 567
6-Chloro-10-methyl-1,2-benzanthracene 568
7-Chloro-10-methyl-1,2-benzanthracene 569
10-Chloromethyl-1,2-benzanthracene 570
3-Chloro-20-methylcholanthrene 790
6-Chloro-20-methylcholanthrene 791
Chloroquinone 245
5-Chloro-o-toluidine 246
5-Chloro-o-toluidine hydrochloride 247
Cholanthrene 792
$\Delta^{2,4}$-Cholestadiene 1057
$\Delta^{3,5}$-Cholestadiene 1058
$\Delta^{2,4}$-Cholestadiene peroxide 1059
Cholestene 1060
Cholestenone 1061
Cholestenone-6-sulfonic acid, sodium salt 1062
Cholesterol 1063
Cholesterol benzoate 1064
Cholesterol palmitate 1065
Cholesterol stearate 1066
α-cholesterylene ..... *See* $\Delta^{3,5}$-cholestadiene
Cholesteryl oleate 1067
Cholic acid 1068
Chromite 20
Chromium 21
Chrysarobin 448
Chrysene 571
Chrysene sulfonic acid, sodium and ammonium salts .. 572
Chrysofluorene 573
Chrysoidin *See* 2,4-diaminoazobenzene-4-hydrochloride
Chrysoidin R .... *See* 5-methyl-2,4-diaminoazobenzene
Chrysoidin Y ..... *See* 2,4-diaminoazobenzene
Cinobufagin 1069
Cobalt 22
Colchicine 449
Congo red 975
Copper sulfate 23
p-Cresol 248
10-Cyano-1,2-benzanthracene 574
5-Cyano-9,10-dimethyl-1,2-benzanthracene 575
10-Cyanomethyl-1,2-benzanthracene 576
5-Cyano-10-methyl-1,2-benzanthracene 577
6-Cyano-10-methyl-1,2-benzanthracene 578
7-Cyano-10-methyl-1,2-benzanthracene 579
6-Cyano-20-methylcholanthrene 793
1,2-Cyclopenteno-5,10-aceanthrene 794
1,2-Cyclopentenoacenaphthene-3'-spirocyclo-2"-methylcylohexane 795
5,6-Cyclopenteno-1,2-benzanthracene 796
6,7-Cyclopenteno-1,2-benzanthracene 797
1,2-Cyclopenteno-5-methylanthracene 580
Cyclohexane 249
Cyclopal ..... *See* 5-allyl-5-Δ^2-cyclopentenylbarbituric acid, sodium salt
1,2-Cyclopentenophenanthrene 581
3,4-Cyclopentenophenanthrene 582
Cymarin 1070
l-Cystine ..... 126 and Add.
DDT *See* 2,2-bis(p-chlorophenyl)-1,1,1-trichloroethane
Decahydronaphthalene 389
Dehydroandrosterone 1071
Decalin ..... *See* decahydronaphthalene
trans-Dehydroandrosterone 1072
Dehydrodesoxycholic acid 1073
Dehydroisoandrosterone *See* trans-dehydroandrosterone
Δ^5-trans-Dehydroisoandrosterone *See* dehydroandrosterone
Dehydronorcholene 1074
Δ^3-Dehydro-3,4-trimethylene-isobenzanthrene-2..... 798
Deoxycholic acid ..... *See* desoxycholic acid
Desoxycholic acid 1075
Desoxycorticosterone 1076
Desoxycorticosterone acetate 1077
9,10-Diacetoxy-1,2-benzanthracene ..... *See* 9,10-benzanthrahydroquinone diacetate
5,6-Diacetoxychrysene 583
Diacetyl-o-aminoazotoluene 976
9-Diacetylamino-1,2,5,6-dibenzanthracene 799
N-Diacetyl-2-aminofluorene 450
N,N'-Diacetyl-p-phenylenediamine 251
Dialin ..... *See* dihydronaphthalene

4,4'-Diamidinostilbene ..... *See* stilbamidine
2,4-Diaminoazobenzene 977
2,4-Diaminoazobenzene-4-hydrochloride 978
2,2'-Diamino-1,1'-dinaphthyl 390
1,2'-Diamino-1',2-dinaphthyl 391
2,2'-Diamino-1,1'-dinaphthyl 979
4',6'-Diamino-2,3'-dimethylazobenzene .....
..... *See* 2',5-dimethyl-2,4-diaminoazobenzene
2,4-Diaminodiphenylamine 252
2,5-Diaminotoluene 253
2,5-Diaminotoluene dihydrochloride 254
p-Di-n-amylaminoazobenzene 980
9,9'-Dianthryl 451
Diazoaminobenzene 981
1,2,5,6-Dibenzacridine 1186
1,2,7,8-Dibenzacridine 1187
1,2,7,8-Dibenzacridine methosulfate 1188
1,2,3,4-Dibenzanthracene 800
1,2,5,6-Dibenzanthracene ..... 801 and Add.
1,2,7,8-Dibenzanthracene 802
2,3,6,7-Dibenzanthracene ..... *See* pentacene
1,2,5,6-Dibenzanthracene choleic acid 803
1,2,5,6-Dibenzanthracene-disulfonic acids, sodium salts 804
1,2,5,6-Dibenzanthracene-9,10-endo-α,β-succinic acid 805
1,2,5,6-Dibenzanthracene-9,10-endo-α,β-succinic acid, sodium salt 806
1,2,5,6-Dibenzanthracene-endo-α,β-succinoylglycine ethyl ester 807
1,2,5,6-Dibenzanthracene-sulfonic acids, sodium salts 808
1,2,5,6-Dibenz-9-anthranol .....
..... *See* 9-hydroxy-1,2,5,6-dibenzanthracene
1,2,5,6-Dibenzanthranyl-9-carbamido-acetic acid 809
1,2,5,6-Dibenzanthranyl-9-carbamido-casein 810
1,2,5,6-Dibenzanthranyl-9-isocyanate 811
N-1,2,5,6-Dibenzanthranyl-succinimide 812
1,2,5,6-Dibenzanthaquinone 813
Dibenzanthrone 929
10-(Di-1,2-benzanthryl)-diphenyl lead 584
1,2,5,6-Dibenzcarbazole 1189
1,2,7,8-Dibenzcarbazole 1190
3,4,5,6-Dibenzcarbazole 1191
1,2,1',2'-Dibenz-6,6'(or 7,7') dianthryl 585
Dibenzfluoranthene 930
1,2,3,4-Dibenzfluorene 814
1,2,5,6-Dibenzfluorene 815
1,2,7,8-Dibenzfluorene 816
3,4,5,6-Dibenzfluorene 817
1,2,5,6-Dibenzfluorenone 818
1,2,3,4-Dibenzphenanthrene 819
1,2,5,6-Dibenzphenanthrene 820
3,4,5,6-Dibenzphenanthrene 821
1,2,5,6-Dibenzphenazine 1192
1,2,3,4-Dibenzpyrene 931
3,4,8,9-Dibenzpyrene 932
3,4,8,9-Dibenzpyrene-5,10-hydroquinone sodium sulfite 933
3,4,8,9-Dibenzpyrene-5,10-quinone 934
Dibenzyl 255
N,N'-Dibenzyl thiourea 256
9,10-Dibenzylanthracene 452
9,10-Dibenzyl-1,2,5,6-dibenzanthracene 822
β,β'-Dibromodiethyl sulfide 127
β,β'-Dibromodiethyl sulfone 128
p-Di-n-butylaminoazobenzene 982
9,10-Di-n-butyl-1,2,5,6-dibenzanthracene 823
N,N-Di-n-butyl-p-phenylenediamine 257
3,4-Dicarbomethoxyphenanthrene 453
p-Dichlorobenzene 258
1,1-Dichloro-2,2-bis(p-chlorophenyl)-ethane 259
β,β'-Dichlorodiethyl ether 129
β,β'-Dichlorodiethyl sulfide 130
β,β'-Dichlorodiethyl sulfone 131
β,β'-Dichlorodiethyl sulfoxide 132
Dichloromethane 133
p,p'-Dichlorodiphenylacetic acid, sodium salt 260
Dichloromercuro-3,4-benzpyrene 824
2,4-Dichlorophenoxyacetic acid 261
4,4'-Dichlorophenyldichloroethylene 262
1,2-Dichloropropane 134
Dicholesteryl ether 1078
Diels hydrocarbon .....
..... *See* 3'-methyl-1,2-cyclopentenophenanthrene
Diels hydrocarbon No. 2 825
N,N-Diethanol-p-aminoazobenzene 983
α,α-Di-(p-ethoxyphenyl)-β-phenylbromoethylene 263
p-Diethylaminoazobenzene 984
x-(β-Diethylaminoethyl)-aminochrysene 586
β-Diethylaminoethylfluorene-9-carboxylate hydrochloride 454
10-Diethylaminomethyl-1,2-benzanthracene 587
5,5-Diethylbarbituric acid, sodium salt 1193
9,10-Diethyl-1,2-benzanthracene 588
2,9-Diethyl-3,4-benzphenanthrene 589
Diethylene glycol 135
Diethylene glycol monobutyl ether 136
Diethylene glycol monoethyl ether 137

Diethylene glycol monomethyl ether 138
1,2-Diethylnaphthalene 392
Diethylstilbene 264
Diethylstilboestrol .....
..... *See* 4,4'-dihydroxy-α,β-diethylstilbene
Digitonin 1079
Digitoxigenin 1080
Digotoxin 1081
1',2'-Dihydro-3,4-benzpyrene-3',4'-dicarboxylic anhydride 826
meso-Dihydrocholanthrene 827
9,10-Dihydro-1,2,6,7-dibenzacridine 1194
9,10-Dihydro-3,4,5,6-dibenzacridine 1195
9,10-Dihydro-1,2,5,6-dibenzanthracene 828
5,10-Dihydro-3,4,8,9-dibenzpyrene (?) 935
α-Dihydroequilenin 1082
β-Dihydroequilenin 1083
Dihydroestrin benzoate ..... *See* estradiol benzoate
Dihydrofolliculin benzoate .. *See* estradiol benzoate
7,8-Dihydro-5-methyl-1,2-benzanthracene 590
9,10-Dihydro-10-methyl-1,2-benzanthracene 591
1',2'-Dihydro-4'-methyl-3,4-benzpyrene 829
6,7-Dihydro-20-methylcholanthrene 830
meso-Dihydro-20-methylcholanthrene 831
Dihydro-20-methylcholanthrene-dicarboxylic acid, potassium salt 832
9,10-Dihydronaphthacene 592
Dihydronaphthalene 393
5,6-Dihydronaphtho-(1,2-g)-quinoline 1196
3,4-Dihydrophenanthrene-1,2-dicarboxylic anhydride . 455
7,8-Dihydrophenalyl-7-spirocyclopentane 456
Dihydrotachysterol 1084
Dihydrotestosterone 1085
Dihydrotheelin ..... *See* estradiol
3',7'-Dihydroxy-1,2,5,6-dibenzanthracene 833
4',8'-Dihydroxy-1,2,5,6-dibenzanthracene 834
Dihydroxy-1,2,5,6-dibenzanthracene 835
4,4'-Dihydroxy-α,β-dibenzylidenedibenzyl 265
9,10-Dihydroxy-9,10-di-n-butyl-9,10-dihydro-1,2,5,6-dibenzanthracene 836
9,10-Dihydroxy-9,10-dicyclohexyl-9,10-dihydro-1,2,5,6-dibenzanthracene 837
9,10-Dihydroxy-9,10-dicyclopentyl-9,10-dihydro-1,2,5,6-dibenzanthracene 838
4,4'-Dihydroxy-α,β-diethylstilbene 266
4,4'-Dihydroxy-α,β-diethylstilbene dibenzoate 267
4,4'-Dihydroxy-α,β-diethylstilbene dimethyl ether .. 268
4,4'-Dihydroxy-α,β-diethylstilbene dipropionate 270 and Add.
4,4'-Dihydroxy-α,β-diethylstilbene monomethyl ether . 271
9,10-Dihydroxy-9,10-dimethyl-9,10-dihydro-1,2-benzanthracene ..... *See* 9,10-dimethoxy 9,10-dimethyl-9,10-dihydro-1,2-benzanthracene
4,4'-Dihydroxy-α,β-dimethyl stilbene 272
1,2-Dihydroxy-1,2-di-α-naphthylacenaphthene 457
1,2-Dihydroxy-1,2-diphenylacenaphthene 458
4,4'-Dihydroxy-γ,δ-diphenyl-α-δ-hexadiene 273
4,4'-Dihydroxy diphenyl hexane .....
..... *See* γ-δ-di(p-hydroxyphenyl)hexane
4,4'-Dihydroxydiphenylmethane 274
9,10-Dihydroxy-9,10-di-n-propyl-9,10-dihydro-1,2,5,6-dibenzanthracene 839
Dihydroxyestrin ..... *See* estradiol
2,7-Dihydroxynaphthalene 394
2,4-Di(p-hydroxyphenyl)-3-ethylhexane 275
γ-δ-Di(p-hydroxyphenyl)-hexane 276
β,β-Di(4-hydroxyphenyl)-propane 277
Dihydroxypyrene-disulfonic acid, di-sodium salt 593
4,4'-Dihydroxystilbene 278
β,β'-Diiododiethyl sulfone 139
3,5-Diiodotyrosine 279
1,5-Di-isopropenylanthracene 459
Di-isopropyl fluorophosphate 140
Dimenformone ..... *See* estradiol benzoate
3,10-Dimethoxy-1,2-benzanthracene 594
9,10-Dimethoxy-1,2-benzanthracene 595
5,8-Dimethoxy-3,4-benzpyrene 840
5,10-Dimethoxy-3,4-benzpyrene 841
5,6-Dimethoxychrysene 596
9,10-Dimethoxy-1,2,5,6-dibenzanthracene 842
9,10-Dimethoxy-9,10-dimethyl-9,10-dihydro-1,2-benzanthracene 597
γ-δ-Di-(p-methoxyphenyl)-hexane 280
1,2-Dimethyl-5,10-aceanthrene 598
9,10-Dimethyl-3,4-ace-1,2-benzanthracene 843
2,3-Dimethyl-6,7-acechrysene 844
p-Dimethylaminoazobenzene 985
4-Dimethylaminoazobenzene-4'-arsonic acid 986
4-Dimethylaminoazobenzene-4'-stibinic acid 987
4-Dimethylaminoazobenzene-4'-sulfonic acid, sodium salt 988
p-Dimethylaminobenzeneazo-1-naphthalene 989
4-Dimethylaminobenzene-1-azo-2-naphthalene 990
p-Dimethylaminobenzalaniline 281
p-Dimethylaminobenzaldehyde 282
4'-Dimethylaminobenzylideneaniline 283
p-Dimethylaminohydrazobenzene 991

10-Dimethylaminomethyl-1,2-benzanthracene 599
4-Dimethylamino-2'-methylstilbene 284
1-(4'-Dimethylaminophenyl)-2-(1'-naphthyl)-ethylene. 395
4-Dimethylaminostilbene 285
1,2-Dimethylanthracene 460
1,3-Dimethylanthracene 461
1,4-Dimethylanthracene 462
2,3-Dimethylanthracene 463
9,10-Dimethylanthracene 464
2,3'-Dimethylazobenzene 992
2,3'-Dimethylazobenzene-4'-diazonium sulfate 993
2,3'-Dimethylazobenzene-4'-methylcarbonate 994
5,9-Dimethyl-3,4-benzacridine 1197
6,9-Dimethyl-1,2-benzacridine 1198
6,9-Dimethyl-3,4-benzacridine 1199
7,9-Dimethyl-3,4-benzacridine 1200
N,N-Dimethyl-N'-benzal-p-phenylenediamine 286
1',10-Dimethyl-1,2-benzanthracene 600
2',6-Dimethyl-1,2-benzanthracene 601
2',7-Dimethyl-1,2-benzanthracene 602
3',6-Dimethyl-1,2-benzanthracene 603
3',7-Dimethyl-1,2-benzanthracene 604
3,9-Dimethyl-1,2-benzanthracene 605
4,9-Dimethyl-1,2-benzanthracene 606
4,10-Dimethyl-1,2-benzanthracene 607
5,6-Dimethyl-1,2-benzanthracene 608
7,8-Dimethyl-1,2-benzanthracene 609
5,9-Dimethyl-1,2-benzanthracene 610
5,10-Dimethyl-1,2-benzanthracene 611
6,7-Dimethyl-1,2-benzanthracene 612
8,10-Dimethyl-1,2-benzanthracene 613
9,10-Dimethyl-1,2-benzanthracene 614
9,10-Dimethyl-1,2-benzanthracene-endo-α,β-succinic acid, sodium salt 615
9,10-Dimethyl-1,2-benzanthracene-9,10-peroxide 616
9,10-Dimethyl-1,2-benzanthracene photo-oxide ..... *See* 9,10-dimethyl-1,2-benzanthracene-9,10-peroxide
9,10-Dimethyl-1,2-benzanthracene-9,10-oxide .... *See* 9,10-dimethyl-9,10-dihydro-1,2-benzanthracene-oxide
2,9-Dimethyl-3,4-benzphenanthrene 617
6,7-Dimethyl-3,4-benzphenanthrene 618
4,9-Dimethyl-2,3-benzthiophanthrene 1201
4,9-Dimethyl-5,6-benzthiophanthrene 1202
4,9-Dimethyl-2,3,5,6-dibenzthiophanthrene 1203
4,9-Dimethyl-1,2,7,8-dibenzthiophanthrene 1204
15,20-Dimethylcholanthrene 845
16,20-Dimethylcholanthrene 846
2,3-Dimethylchrysene 619
4,5-Dimethylchrysene 620
5,6-Dimethylchrysene 621
3,9-Dimethylcyclopentenophenanthrene 622
2',5-Dimethyl-2,4-diaminoazobenzene 996
9,10-Dimethyl-1,2,3,4-dibenzanthracene 847
9,10-Dimethyl-1,2,5,6-dibenzanthracene 848
9,10-Dimethyl-1,2,7,8-dibenzanthracene 849
9,10-Dimethyl-9,10-dihydro-1,2-benzanthracene-9,10-oxide 623
cis-9,10-Dimethyl-9,10-dihydro-1,2,5,6-dibenzanthracene ... 850
2,4'-Dimethyl-4-dimethylaminoazobenzene 997
3,4'-Dimethyl-4-dimethylaminoazobenzene 998
Dimethyl dinaphthyl pyrene 624
4',3-Dimethylene-1,2,5,6-dibenzanthracene ..... *See* phenanthra-acenaphthene
6,9-Dimethyl flavin 1205
2,4-Dimethylfluoranthrene 625
7,7'-Dimethyl-2',3'-naphtho-1,2-anthracene 851
2,6-Dimethyl-1,4-naphthoquinone-2,3-dimethylbutadiene . 465
2,6-Dimethyl-3,4-naphthoquinone-2,3-dimethylbutadiene 466
1,9-Dimethylphenanthrene 467
N,N-Dimethyl-p-phenylenediamine 287
N,N-Dimethyl-p-phenylenediamine monohydrochloride .. 289
Dimethyl phthalate ..... *See* under 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane .. 288
1,8-Dimethylpicene 852
1,6-Dimethylpleiadene 626
4,9-Dimethyl-1',2',3',4'-tetrahydro-1,2-benzanthracene *See* 1',2',3',4'-tetrahydro-4,9-dimethyl-1,2-benzanthracene
1,6-Dimethylthiopleiadene 1206
1,4-Dimethyltriphenylene 627
2,3,8,9-Di(1',2'-naphtho)-chrysene 936
Dinaphtho(2,1,1',2')furan 1207
β',β',β,α-Dinaphthofuran 1208
Dinaphthoperylene 937
Dinaphtho(2,1,1',2')thiophene 1209
α,α-Dinaphthyl 398
β,β-Dinaphthyl 399
9,10-Di-α-naphthylanthracene 468
α,α-Dinaphthylamine 400
β,β-Dinaphthylamine 401
Dinaphthylenedioxide 1210
β-Dinaphthyl ether 402
Di-2-naphthylethylene 403
Dinitro-3,4-benzpyrene 853
3,5-Dinitro-o-cresol, sodium salt 290

2,4-Dinitro-1-napthol 404
2,4-Dinitrotoluene 291
Dioctyl ester of sodium sulfosuccinate *See* Aerosol-OT
Dioxane 1211
Diphenyl 292
Diphenylacetic acid 293
Diphenylamine 294
Diphenylaminochlorarsine 1212
9,10-Diphenylanthracene 469
9,10-Diphenyl-1,2-benzanthracene 628
Diphenylbenzidine 295
Diphenylchlorarsine 296
5,6-Diphenylchrysene 629
Diphenylcyanarsine 297
10,10'-Diphenyl-9,9'-dianthryl 470
9,12,10,11-Diphenylene-9,10-diphenyl-9,10-dihydro-naphthacene 938
bis-Diphenylene-ethylene 471
9,12,10,11-Diphenylenenaphthacene 939
Diphenylene oxide 1213
Diphenylethane 298
α,α-Diphenyl-β-ethyl-α-amylene ..... 299 and Add.
α,α-Diphenyl-β-ethyl-α-butylene ..... 300 and Add.
Diphenylhexadiene 301
Diphenylhexane 302
α,α-Diphenyl-β-methyl-α-propylene ..... 303 and Add.
Diphenyl-α-napthylcarbinol 405
p-Di-n-propylaminoazobenzene 999
9,10-Di-n-propyl-1,2-benzanthracene 630
Dipropylene glycol 141
3,4-Disodium phenanthrene dicarboxylate ..... *See* phenanthrene-3,4-dicarboxylic acid disodium salt
1,4-Distyrylbenzene ..... 304 and Add.
Dodecahydro-1,2-benzanthracene 631, 632, 633
1,2,3,4,5,6,7,10,17,20,22,23-dodecahydrocholanthrene 854
Dodecahydrotriphenylene 634
Dolophine 142
Edicol Amaranth A S 1000
Edicol Orange I S 1001
Edicol Ponceau RS 1002
Ephedrine sulfate 305
Erythritol tetranitrate 143
Eosin 1214
Epinephrine ..... *See* adrenaline
Equilenin 1086
Equilenin benzoate 1087
Equilin 1088
Equilin benzoate 1089
Ergosterol 1090
Estradiol 1091
Estradiol-3-acetate-17-benzoate 1092
Estradiol-3-acetate-17-propionate 1093
Estradiol benzoate 1094
Estradiol-3-benzoate-17-acetate 1095
Estradiol-3-benzoate-17-n-butyrate 1096
Estradiol-17-benzoate-3-n-butyrate 1097
Estradiol-benzoate-butyrate 1098
Estradiol-3-benzoate-17-propionate 1099
Estradiol-3-benzoate-17-n-valerate 1100
Estradiol-3-n-butyrate-17-benzoate 1101
Estradiol-17-caprylate 1102
Estradiol caprylate 1103
Estradiol di-n-butyrate 1104
Estradiol dicaprate 1105
Estradiol di-n-hexanoate 1106
Estradiol di-isobutyrate 1107
Estradiol di-n-octanoate 1108
Estradiol dipalmitate 1109
Estradiol dipropionate 1110
Estradiol di-n-valerate 1111
Estradiol-3-propionate-17-benzoate 1112
Estriol 1113
Estrone 1114
Estrone benzoate 1115
Estrone n-hexanoate 1116
Estrone methyl ether 1117
Estrone n-octanoate 1118
Ether 144
17-Ethinyl estradiol 1119
Ethinyl testosterone 1120
10-Ethoxymethyl-1,2-benzanthracene 635
Ethyl acetate 145
Ethyl alcohol 146
9-Ethylanthracene 472
5-Ethyl-1,2-benzanthracene 636
8-Ethyl-1,2-benzanthracene 637
10-Ethyl-1,2-benzanthracene 638
2-Ethyl-3,4-benzphenanthrene 639
Ethyl benzoate 306
5,5-Ethyl-n-butyl-barbituric acid, sodium salt 1215
Ethyl carbamate ..... 147 and Add.
20-Ethylcholanthrene 855
Ethylene-bis-chloroethyl sulfide 148
Ethylene glycol 149
Ethylene glycol diacetate 150
Ethylene glycol mono-n-butyl ether 151

Ethylene glycol monoethyl ether 152
Ethylene glycol monomethyl ether 153
Ethylene glycol monoisopropyl ether 154
Ethylene glycol mono-n-propyl ether 155
5-Ethyl-7,8-dihydro-1,2-benzanthracene 640
5-Ethyl-9,10-dimethyl-1,2-benzanthracene 641
5,5-ethyl-isoamyl-barbituric acid, sodium salt 1216
5,5-Ethyl-isopropyl-barbituric acid, calcium salt .. 1217
5,5-Ethyl-isopropyl-barbituric acid, sodium salt ... 1218
5-Ethyl-5-(1-methyl-1-butenyl)-barbituric acid, sodium salt 1219
5,5-Ethyl-(1-methylbutyl)-barbituric acid, sodium salt 1220
5,5-Ethyl-(1-methylbutyl)-thiobarbituric acid, sodium salt 1221
Ethyl-β-naphthylamine hydrochloride 406
Ethyl palmitate 156
5,5-Ethyl-phenylbarbituric acid, sodium salt 1222
α-Ethyl-β-sec-butylstilbene 307
Ethyl stearate 157
Fast brown G 1003
Fluoranthene 642
Fluorene 473
Fluorenone 474
3-Fluortyrosine 308
Folliculin ..... *See* estrone
Folliculin benzoate ..... *See* estrone benzoate
Formaldehyde 158
Formalin ..... *See* formaldehyde
2-Formyl-3,4-benzphenanthrene 643
Fructose 1225
Fuchsine 309
Fumaric acid 159
Furfural 1226
Galactose 1227
Gentian violet 310
Glucose 1228
Glycerol 160
Glycocholic acid 1121
Gold calcium thiomalate 24
Gold sodium thiosulfate 25
Gold sulfide 26
Gold thioglucose 27
Hematoxylin 1229
Hexadiene ... *See* 4,4' dihydroxy-γ-Δ-diphenyl-β-Δ-hexadiene
1,2,3,4,11,14-hexahydro-20-methylcholanthrene 856
Hexamethylenetetramine 1230
4,4',4'-Hexamethyltriaminotriphenylmethane 311
Hexestrol ..... *See* γ-Δ-di(p-hydroxyphenyl) hexane
5-n-Heptyl-1,2-benzanthracene 644
Hexabromonaphthacene 645
1',2',3',4',9,10-Hexahydro-10-methyl-1,2-benzanthracene 646
sym-Hexahydropyrene 647
unsym-Hexahydropyrene 648
5-n-Hexyl-1,2-benzanthracene 649
Hippuric acid 312
Histamine 1231
Histamine dihydrochloride 1232
"Hydrocarbon A" 1320
Hydrochloric acid 28
Hydrocyanic acid 29
Hydrodibenzpyrene . *See* 5,10-dihydro-3,4,8,9-dibenzpyrene
Hydrogen sulfide 30
Hydroquinone 313
Hydroretene 475
3-Hydroxy-4-(p-aminophenylazo)-1,2-benzanthracene . 1004
4-Hydroxyazobenzene 1005
7-Hydroxy-2-acetaminofluorene 476
4-Hydroxy-2',3-azotoluene *See* 4'-hydroxy-2,3'-azotoluene
4'-Hydroxy-2,3'-azotoluene 1006
3-Hydroxy-1,2-benzanthracene 650
4'-Hydroxy-1,2-benzanthracene 651
8-Hydroxy-1,2-benzanthracene 652
10-Hydroxy-1,2-benzanthracene 653
3-Hydroxy-1,2-benzanthracene benzoate 654
3-Hydroxy-1,2-benzanthracene stearate 655
m-Hydroxybenzoic acid 314
p-Hydroxybenzoic acid 315
2-Hydroxy-3,4-benzpyrene 857
4'-Hydroxy-3,4-benzpyrene 858
5-Hydroxy-3,4-benzpyrene 859
6-Hydroxy-3,4-benzpyrene 860
8-Hydroxy-3,4-benzpyrene 861
4'-Hydroxy-3,4-benzpyrene acetate 862
4'-hydroxy-3,4-benzpyrene p-aminobenzoate 863
1-Hydroxychrysene 656
3-Hydroxychrysene 657
4-Hydroxychrysene 658
6-Hydroxychrysene 659
x-Hydroxychrysene 660
9-Hydroxy-1,2,5,6-dibenzanthracene 864
4-Hydroxydibenzyl 316
4'-Hydroxy-2,3'-dimethylazobenzene .... *See* 4'-hydroxy-2,3'-azotoluene
4-Hydroxydiphenylamine 317
Hydroxyestrin benzoate ..... *See* estradiol benzoate

α-Hydroxy-10-ethyl-1,2-benzanthracene 661
10-β-Hydroxyethyl-1,2-benzanthracene 662
1-(2-Hydroxyethylcarbamylmethyl)-pyridinium chloride, lauric ester 1233
3-Hydroxy-10-methyl-1,2-benzanthracene 663
10-Hydroxymethyl-1,2-benzanthracene 664
2-Hydroxy-20-methylcholanthrene 865
3-Hydroxy-20-methylcholanthrene 866
15-Hydroxy-20-methylcholanthrene 867
4-Hydroxyphenylglycine 318
Hydroxyphenthiazone 1234
p-Hydroxypropenylbenzene 319
x-Hydroxypyrene 665
3-Hydroxypyrene-5,8,10-trisulfonic acid, sodium salt 666
4-Hydroxystilbene 320
Indium 31
Indium chloride 32
Indium sulfate 33
Indole 1235
Indole-3-acetic acid 1236
γ-(Indole-3)-n-butyric acid 1237
β-(Indole-3)-propionic acid 1238
2,9(N)-Indoloanthrone 1239
Indophenol 321
Inositol 322
Insulin 1321
Integerrimine 1322
Iodine 34
Iodoacetic acid 161
Iron oxide 35
Isoamyl carbamate ..... 162 and Add.
d-Isoascorbic acid 1240
d-Isoascorbyl palmitate 1241
Iso-naphthathioxin 1242
7-Isopropenyl-1,2-benzanthracene dimer 667
10-Isopropenyl-3,4-benzpyrene 868
1-Isopropenylnaphthalene, dimer 407
3-Isopropyl-1,2-benzanthracene 668
5-Isopropyl-1,2-benzanthracene 669
6-Isopropyl-1,2-benzanthracene 670
7-Isopropyl-1,2-benzanthracene 671
8-Isopropyl-1,2-benzanthracene 672
10-Isopropyl-1,2-benzanthracene 673
6-Isopropyl-2,3-benzanthracene ..... *See* β-isopropylnaphthacene
1-Isopropyl-3,4-benzphenanthrene 674
2-Isopropyl-3,4-benzphenanthrene 675
Isopropyl carbamate 1332
20-Isopropylcholanthrene 869
2-Isopropylchrysene 676
2-Isopropyl-8-methyl-3,4-benzphenanthrene ..... *See* 10-methyl-3'-isopropyl-1,2-benzanthracene
β-Isopropylnaphthacene 677
10-Isothiocyanomethyl-1,2-benzanthracene 678
Jacobine 1323
3-Keto-aetio-allocholanol-17 *See* dihydroandrosterone
12-Keto-18,19-bisnorcholanic acid 1122
12-Ketocholadienic acid 1123
1-Ketocholanthrene ..... *See* 15-ketocholanthrene
15-Ketocholanthrene 870
Ketoestrin benzoate ..... *See* estrone benzoate
Ketohydroxyoestrin ..... *See* estrone
Ketohydroxyoestrin benzoate ... *See* estrone benzoate
Ketohydroxyoestrone benzoate .. *See* estrone benzoate
Ketomethoxyoestrin ..... *See* estrone methyl ether
15-Keto-20-methylcholanthrene 871
1-Keto-octahydroanthracene 477
4'-Keto-1',2',3',4'-tetrahydro-3,4-benzpyrene 872
1-Keto-1,2,3,4-tetrahydrophenanthrene 478
Lactic acid 163
Lactose 1243
Lauric acid 164
Lauryl diethylenetriamine 165
Lead 36
Lead acetate 37
Lead acetate, basic 38
Lead arsenate 39
Lead azide 40
Lead carbonate 41
Lead chloride 42
Lead iodide 43
Lead nitrate 44
Lead sulfide 45
Lecithin 166
Leuco neutral red 1244
Light green F.S. 323
Lithium carmine 479
Longilobine 1324
Luminal 1245
Luteogan ..... *See* progesterone
Luteosterone ..... *See* progesterone
Maleic acid, sodium salt 167
Manganese 46
Mannitol 168
Mannitol hexanitrate 169
Mannose 1246

Martius yellow ..... *See* 2,4-dinitro-1-naphthol
Menadiol ..... *See* 2-methyl-1,4-naphthohydroquinone
Menformone ..... *See* estrone
meso-Dihydro-3-methylcholanthrene .....
..... *See* meso-dihydro-20-methylcholanthrene
Mesothorium 47
Metanil yellow YKS 1008
Metanitrazolin ..... *See* m-nitrophenylazo-β-naphthol
3-Methoxy-1,2-benzanthracene 679
4'-Methoxy-1,2-benzanthracene 680
10-Methoxy-1,2-benzanthracene 681
4'-Methoxy-3,4-benzpyrene 873
1-Methoxychrysene 682
2-Methoxychrysene 683
3-Methoxychrysene 684
4-Methoxychrysene 685
6-Methoxychrysene 686
9-Methoxy-1,2,5,6-dibenzanthracene 874
4'-Methoxy-9,10-dimethyl-1,2-benzanthracene 687
3-Methoxy-10-ethyl-1,2-benzanthracene 688
3-Methoxy-10-methyl-1,2-benzanthracene 689
5-Methoxy-10-methyl-1,2-benzanthracene 690
10-Methoxymethyl-1,2-benzanthracene 691
2-Methoxy-20-methylcholanthrene 875
3-Methoxy-20-methylcholanthrene 876
3-Methoxy-10-propyl-1,2-benzanthracene 692
7-Methyl-8,9-ace-1,2-benzanthracene 877
9-Methylacridine 1247
Methyl alcohol 170
4'-Methyl-4-aminoazobenzene 1009
N-Methyl-p-aminoazobenzene 1010
3-Methylamino-1,2-benzanthracene 693
17-Methyl androstanediol-3α, 17α 1124
17-Methyl androstanediol-3β, 17α 1125
17-Methyl Δ^5-androstenediol-3β, 17α 1126
2-Methylanthracene 480
9-Methylanthracene 481
Methylanthracene 482
7-Methyl-1,2-benzacridine 1248
9-Methyl-3,4-benzacridine 1249
7-Methyl-3,4-benzacridine 1250
1'-Methyl-1,2-benzanthracene 694
2'-Methyl-1,2-benzanthracene 695
3-Methyl-1,2-benzanthracene 696
3'-Methyl-1,2-benzanthracene 697
4-Methyl-1,2-benzanthracene 698
4'-Methyl-1,2-benzanthracene 699
5-Methyl-1,2-benzanthracene 700
6-Methyl-1,2-benzanthracene 701
7-Methyl-1,2-benzanthracene 702
8-Methyl-1,2-benzanthracene 703
9-Methyl-1,2-benzanthracene 704
10-Methyl-1,2-benzanthracene 705
10-Methyl-1,2-benzanthracene-5-carbonamide 706
10-Methyl-1,2-benzanthracene-6-carboxylic acid 707
10-Methyl-1,2-benzanthracene-7-carboxylic acid 708
9-Methyl-1,2-benzanthryl-10-acetic acid 709
10-Methyl-1,2-benzanthryl-3-isocyanate 710
9-Methyl-1,2-benzocarbazole 1251
2-Methyl-7,8-benzophenothiazine 1252
3-Methyl-5,6-benzo-9-phenylflavin 1253
1-Methyl-3,4-benzphenanthrene 711
2-Methyl-3,4-benzphenanthrene 712
6-Methyl-3,4-benzphenanthrene 713
7-Methyl-3,4-benzphenanthrene 714
8-Methyl-3,4-benzphenanthrene 715
6-Methyl-3,4-benzphenanthrene-10-carboxylic acid,
sodium salt 716
3'-Methyl-3,4-benzpyrene 878
4'-Methyl-3,4-benzpyrene 879
5-Methyl-3,4-benzpyrene 880
6-Methyl-3,4-benzpyrene 881
9-Methyl-3,4-benzpyrene 882
Methylcellulose 1254
Methyl-bis(β-chloroethylamine) 171
Methyl carbamate 1333
3-Methylcholanthrene ..... *See* 20-methylcholanthrene
4-Methylcholanthrene ..... *See* 22-methylcholanthrene
5-Methylcholanthrene ..... *See* 23-methylcholanthrene
20-Methylcholanthrene ..... 883 and Add.
22-Methylcholanthrene 884
23-Methylcholanthrene 885
20-Methylcholanthrene choleic acid 886
20-Methylcholanthrene-endo-α,β-succinic acid, sodium
salt 888
3-Methylcholanthrene-endo-α,β-succinylglycine ethyl
ester ..... *See* 20-Methylcholan-
threne-endo-α,β-succinylglycine ethyl ester
20-Methylcholanthrene-endo-α,β-succinyl glycine ethyl ester . 889
20-Methylcholanthrene picrate 887
20-Methylcholanthrene-sulfonic acid 890
20-Methylcholanthrene-trinitrobenzene 891
4-Methyl chrysene 717
5-Methyl chrysene 718
6-Methyl chrysene 719
9-Methyl-10-cyano-1,2-benzanthracene 720

3'-Methyl-1,2-cyclopentenophenanthrene (Diels hydrocarbon) 721
9-Methyl-cyclopentenophenanthrene 722
5-Methyl-2,4-diaminoazobenzene 1011
3'-Methyl-1,2,5,6-dibenzacridine 1255
9-Methyl-1,2,7,8-dibenzacridine 1256
2'-Methyl-1,2,5,6-dibenzanthracene 892
3'-Methyl-1,2,5,6-dibenzanthracene 893
4-Methyl-1,2,5,6-dibenzanthracene 894
9-Methyl-1,2,5,6-dibenzanthracene 895
N-Methyl-3,4,5,6-dibenzcarbazole 1257
9-Methyl-1,2,5,6-dibenzfluorene 896
9-Methyl-1,2,7,8-dibenzfluorene 897
9-Methyl-1,2,3,4-dibenzophenanthrene 898
10-Methyl-1,2,3,4-dibenzophenanthrene 899
7-Methyl-1,2,3,4-dibenzpyrene 940
5-Methyl-7,8-dihydro-1,2-benzanthracene ..... *See* 7,8-dihydro-5-methyl-1,2-benzanthracene
4-Methyl-1',2',3',4'-tetrahydro-1,2-benzanthracene . *See* 1',2',3',4'-tetrahydro-4-methyl-1,2-benzanthracene
1',9-Methylene-1,2-benzanthracene 900
1',9-Methylene-1,2-benz-10-anthranol 901
4,5-Methylenechrysene 902
1',9-Methylene-1,2,5,6-dibenzanthracene 941
2-Methyl-4-dimethylaminoazobenzene 1012
2'-Methyl-4-dimethylaminoazobenzene 1013
3'-Methyl-4-dimethylaminoazobenzene 1014
4'-Methyl-4-dimethylaminoazobenzene 1015
2-Methyl-4-dimethylaminoazobenzene hydrochloride ... 1016
9-Methyl-10-ethoxymethyl-1,2-benzanthracene 723
N-Methyl-N-ethyl-p-aminoazobenzene 1017
5-Methyl-9-ethyl-3,4-benzacridine 1258
7-Methyl-9-ethyl-3,4-benzacridine 1259
9-Methyl-10-ethyl-1,2-benzanthracene 724
Methyl ethyl ketone 172
3-Methyl-5,5-ethylphenylbarbituric acid, sodium salt 1223
10-Methyl-3'-Isopropyl-1,2-benzanthracene 725
5-Methyl-8-isopropyl-2',1'-naphtho-1,2-fluorene 903
1-Methyl-3-isopropyl-phenanthrene 483
N-Methyl-2'-methyl-p-aminoazobenzene 1018
N-Methyl-3'-methyl-p-aminoazobenzene 1019
N-Methyl-4'-methyl-p-aminoazobenzene 1020
3-Methyl-5,5-methylcyclohexenylbarbituric acid, sodium salt 1224
10-Methyl-1',9-methylene-1,2-benzanthracene 904
8-Methyl-2',1'-naphtho-1,2-fluorene 905
2-Methyl-1,4-naphthohydroquinone 408
2-Methyl-1,2-naphthohydroquinone diacetate 409
2-Methyl-1,4-naphthohydroquinone di-n-butyrate 410
2-Methyl-1,4-naphthohydroquinone dipropionate 411
2-Methyl-1,4-naphthoquinone 412
Methyl Orange 1021
4-Methylpyrene 726
Methyl Red 1022
Methyl salicylate 324
α-Methylstilbene 325
17-Methyltestosterone 1127
9-Methyl-10-thiocyano-1,2-benzanthracene 727
4-Methyl-2-thiouracil 1260
1-Methyltriphenylene 728
Metrazole 1261
Michler's ketone *See* tetramethyl-p,p'-diaminobenzophenone
Mispickel ..... *See* arsenopyrite
Mustard gas ..... *See* β,β'-dichlorodiethyl sulfide
Mustard oil ..... *See* allyl isothiocyanate
Myristic acid 173
Monochloracetone ..... *See* chloracetone
Monocrotaline 1325
Myristyl-γ-picolinium chloride 1262
Naphthacene 729
Naphthalene 413
Naphthalene fast orange 2 GS 1023
1,2-(1',2'-Naphth)-anthracene 906
2',3'-Naphth-1,2-anthracene 907
Naphthion red 1024
β-Naphthoic acid 414
1',2'-Naphtho-2,3-fluorene 908
2',3'-Naphtho-2,3-fluorene 909
α-Naphthol 415
Naphthol black P 1025
β-Naphthol 416
Naphtho-(1,2-f)-quinoline 1263
Naphtho-(1,2-g)-quinoline 1264
Naphtho-(2,1-f)-quinoline 1265
Naphtho-(2,1-f)-quinoline 1265
Naphtho-(1,2-f)-quinoline methoidide 1266
α-Naphthoquinone 417
β-Naphthoquinoline ..... *See* 5,6-benzoquinoline
β-Naphthoquinone 418
2',3'-Naphtho-1,2-phenanthrene 910
2',3'-Naphtho-2,3-phenanthrene 911
2',3'-Naphtho-3,4-pyrene 942
Naphthoylbenzoic acid 419
α-Naphthylamine 420
β-Naphthylamine 421
β-Naphthylamine hydrochloride 422

α-Naphthyl thiourea 423
Nembutal ..... *See* 5-ethyl-5-(1-methylbutyl)-barbituric acid, sodium salt
Neoarsphenamine 326
Neosalvarsan ..... *See* neoarsphenamine
Neoergosterol 1128
Nembutal 1267
Neutral red 1268
Nickel 18
Nicotine 1269
Nitric acid 49
10-Nitro-1,2-benzanthracene 730
m-Nitrobenzoic acid 327
5-Nitro-3,4-benzpyrene 912
x-Nitrochrysene 731
9-Nitro-1,2,5,6-dibenzanthracene 913
o-Nitrodiphenyl 328
2-Nitrofluorene .....,484 and Add.
Nitrogen mustard ..*See* methyl(bis-β-chlorethylamine)
m-Nitrophenylazo-β-naphthol 1026
x-Nitropyrene 732
p-Nitrosodimethylaniline 329
Octahydroanthracene 485
Octahydro-1,2,5,6-dibenzanthracene 914
Octahydrophenanthrene 486
Oestr- ..... *See* under estr-
Oestrin ..... *See* estrone
Oestroform-β ..... *See* estrone benzoate
Oleic acid 174
Olivine 50
Orange I ..... *See* Edicol orange IS
Orange II 1027
Ouabain 1129
Oxalyl-o-aminoazotoluene 1028
4'-Oxalyamino-2,3'-dimethylazobenzene ..... *See* oxalyl-o-aminoazotoluene
4,10-Oxalyl-1,2-benzanthracene 915
Oxynone ..... *See* 2,4-diaminodiphenylamine
Palmitic acid 175
Paludrine 330
Pantoyltaurine 176
Paraldehyde 1270
Pentacene 916
Pentachlorophenol 331
Pentaerythritol tetranitrate 177
2',3',4',5',6'-Pentamethyl-4-aminoazobenzene 1029
Pentaphenylethane 332
Pentobarbital ..... *See* 5-ethyl-5-(1-methylbutyl)-barbituric acid, sodium salt
Perhydrochrysene 733
Perylene 917
Phemerol 333
Phenanthra-acenaphthene 943
2',3'-Phenanthra-1,2-anthracene 944
Phenanthrafluorene 945
2',3'-Phenanthra-2,3-phenanthrene 946
Phenanthrene 487
Phenanthrene choleic acid 488
Phenanthrene-3,4-dicarboxylic acid 489
Phenanthrene-3,4-dicarboxylic acid, sodium salt 490
Phenanthrene-1,2-dicarboxylic anhydride 491
Phenanthrenequinone 492
Phenobarbitone ..... *See* luminal
Phenothiazine 1271
9-Phenothiazone 1272
Phenylacetic acid 334
dl-Phenylalanine 335
1-Phenylanthracene 493
2-Phenylanthracene 494
9-Phenylanthracene 495
Phenylazo-2-naphthylamine 1030
5-Phenyl-1,2-benzanthracene 735
6-Phenyl-1,2-benzanthracene 736
9-Phenyl-10-carbomethoxyanthracene 496
9-Phenyl-10-carboxyanthracene 497
5-Phenyl-1,2,3,4-dibenzpyrene 947
1-Phenyl-3,4-dihydro-8,9-acephenanthrene 737
m-Phenylenediamine 336
o-Phenylenediamine 337
p-Phenylenediamine 338
9-Phenylflavin 1274
Phenylglycine 339
Phenylisocrotonic acid 340
α-Phenylnaphthalene 424
Phenyl-α-naphthylamine 425
Phenyl-β-naphthylamine 426
9-Phenyl-10-α-naphthylanthracene 498
9-Phenyl-10-(phenyl-4'-anthranyl)-anthracene ... *See* 10,10'-diphenyl-9,9'-dianthryl
Phenylpropionic acid 341
Phenylthiocarbamide 342
Phosphorus 51
Phosphorus (white or yellow) 52
Phthalic acid 343
Phthalylsulfathiazole 1275
Phthiocol 427
Picene 918

Picric acid 344
Pigment Bordeaux N 1031
10-Pineronyl-9,10-dihydro-1,2,7,8-dibenzacridine ... 1276
Pitchblende ..... *See* uraninite
Platyphylline 1326
Plutonium 53
Polonium 54
Polyacenaphthylene 499
Polyvinyl alcohol 178
Ponceau G ..... *See* Naphthalene fast orange 2GS
Ponceau 4GB 1032
Ponceau 2R ..... *See* Edicol ponceau R.S.
Potassium acid phthalate 345
Potassium acid saccharate 179
Potassium arsenite 55
Potassium dicarboxybenzanthracene-dicarboxylic acid, potassium salt
Potassium hydroxide 56
Potassium picrate 346
Potassium thiocyanate 57
Pregnanediol 1130
Progesterone 1131
Progestin ..... *See* progesterone
Progynon ..... *See* estrone
Progynon B ..... *See* estradiol benzoate
Progynon C ..... *See* 17-ethinylestradiol
Prolan 1327
l-proline 1277
Promin 347
Prontosil 1033
Prontosil soluble 1034
p-Propenylphenol ..... *See* p-hydroxypropenylbenzene
Propionaldehyde 180
Propyl alcohol 181
9-n-Propyl-3,4-benzacridine 1278
5-n-Propyl-1,2-benzanthracene 738
10-n-Propyl-1,2-benzanthracene 739
2-n-Propyl-3,4-benzphenanthrene 740
Propyl carbamate 182
5-n-Propyl-9,10-dimethyl-1,2-benzanthracene 741
Propylene glycol 183
6-n-Propyl-2-thiouracil 1279
Pyrene 742
Pyrene-2-sulfonic acid, sodium salt 743
β-(3-Pyrenoyl)-propionic acid 744
Pyridine 1280
1,2(N)-Pyridinoanthracene .... *See* β-anthraquinoline
1,2(N)-Pyridinoanthracene methiodide .. *See* β-anthraquinoline methiodide
3(N),4-Pyridinophenanthrene ..... *See* naphtho-(1,2-f)-quinoline
3(N),4-Pyridinophenanthrene methiodide *See* naphtho-(1,2-f)-quinoline
3(N),4-Pyridinopyrene 1281
Pyrogallic acid ..... *See* Pyrogallol
Pyrogallol 348
Pyromucic acid 1282
Pyrrole 1283
Quartz ..... *See* silicon dioxide
d-Quartz 58
l-Quartz 59
Quaternphenyl ..... *See* benzerythrene
Radium 60
Radium bromide 61
Radium chloride 62
Radium sulfate 63
Radon 64
Retene 500
Ricinoleic acid 184
Rotenone 1284
Rubrene ..... *See* 9,10,11,12-tetraphenylnaphthacene
Rutin 1285
Salicylamide 349
Salicylic acid 350
Salvarsan ..... *See* arsphenamine
Sarsasapogenin 1132
Scarlet R ..... *See* Scarlet red
Scarlet red 1035
Scillaren 1133
Seneciphylline 1328
Selenium ..... *See* ammonium potassium selenide
dl-Serine 135
Silicon dioxide 65
Silver 66
Silver nitrate 67
Skatole 1286
Sodium acetate 68
Sodium alurate 1287
Sodium arsenite 69
Sodium azide 70
Sodium benzoate 351
Sodium bicarbonate 71
Sodium bisulfite 72
Sodium chloride 73
Sodium desoxycholate 1134
Sodium diphenyl hydantoinate 1286
Sodium fluoride 74
Sodium hydroxide 75

Sodium nitrite 76
Sodium oxalate 77
Sodium pentachlorophenate ..... 352 and Add.
Sodium phenobarbital ..... *See* sodium luminal
Sodium picrate 353
Sodium selenite 78
Sodium succinimido-aurate 79
Sodium succinyl sulfathiozole .. *See* 2-(N^4-succinyl-sulfanilamido)-thiazole, sodium salt
Sodium sulfate 80
Sodium tungstate 81
Sorbitol 186
Spartioidine 1329
Stearic acid 187
Stilbamidine 354
Stilbene 355
Stilbestrol (Stilboestrol) ..... *See* 4,4'-dihydroxy-α,β-diethylstilbene
Stilbestrol dimethylether ..... *See* 4,4'-dihydroxy-α,β-diethylstilbene dimethyl ether
Streptomycin 1289
Strontium (radioactive) 82
Strophanthidin 1135
Strophanthin-K 1136
Styrene 356
Styryl 245 1290
Styryl 427 1291
Styryl 430 1292
4'-Succinoylamino-2,3'-dimethylazobenzene 1036
2-(N^4-Succinyl-sulfanilamido)-thiazole 1293
2-(N^4-Succinyl-sulfanilamido)-thiazole, sodium salt. 1294
Succinyl sulfathiazole ..... *See* 2-(N^4-succinyl-sulfanilamido)-thiazole
Sucrose 1295
Sudan I 1037
Sudan II 1038
Sudan III 1039
Sudan IV ..... *See* Scarlet red
Sulfadiazine 1296
Sulfaethylthiazol, sodium salt 1297
Sulfaguanidine 357
Sulfamerazine 1298
Sulfamethazine 1299
Sulfamic acid 83
p-Sulfamidophenylazosalicylic acid, lithium salt ... 1040
Sulfanilamide 358
p-Sulfanilylamide-dimethylaniline 359
Sulfanyl guanidine ..... *See* sulfaguanidine
Sulfapyrazine 1300
Sulfapyridine 1301
Sulfapyridine, sodium salt 1302
Sulfasuxidine .. *See* 2-(N^4-succinyl-sulfanilamido)-thiazole
Sulfathiazole 1303
Sulfathiazole, sodium salt 1304
10-Sulfhydrylmethyl-1,2-benzanthracene 745
Testosterone 1137
Testosterone acetate 1138
Testosterone acetate 3-enolbenzoate 1139
Testosterone acetate 3-enol-n-butyrate 1140
Testosterone acetate 3-enolpropionate 1141
Testosterone benzoate 1142
Testosterone n-butyrate 1143
Testosterone n-butyrate 3-enolacetate 1144
Testosterone dipropionate ..... *See* testosterone enoldipropionate
Testosterone enoldipropionate 1145
Testosterone formate 1146
Testosterone isobutyrate 1147
Testosterone isobutyrate 3-enolacetate 1148
Testosterone isobutyrate 3-enolpropionate 1149
Testosterone propionate 1150
Testosterone propionate 3-enolpropinate ..... *See* testosterone enoldipropionate
Tetrachloro-p-benzoquinone 360
Tetrachloroethane 188
1',2',3',4'-Tetrahydro-4,10-ace-1,2-benzanthracene . 919
2,3-Tetrahydrobenzanthracene ..... *See* tetrahydro-naphthacene
1',2',3',4'-Tetrahydro-3,4-benzpyrene 920
1',2',3',4'-Tetrahydro-4,9-dimethyl-1,2-benzanthracene 746
1',2',3',4'-Tetrahydro-4,10-dimethyl-1,2-benzanthracene 747
1',2',3',4'-Tetrahydro-4-methyl-1,2-benzanthracene . 748
1',2',3',4'-Tetrahydro-10-methyl-1,2-benzanthracene. 749
5,6,7,8-Tetrahydro-10-methyl-1,2-benzanthracene 750
Tetrahydronaphthacene 751
Tetrahydronaphthalene 428
Tetralin ..... *See* tetrahydronaphthalene
γ-(2-Tetralyl)-butyric acid 429
2,5,2',4'-Tetramethyl-4-aminoazobenzene 1041
Tetramethyl-p-p'-diaminoazoxybenzene 1042
2,3,6,7-Tetramethylanthracene 501
5,7,8,9-Tetramethyl-3,4-benzacridine 1305
5,6,9,10-Tetramethyl-1,2-benzanthracene 752
Tetramethyl-p,p'-diaminobenzophenone 361
Tetramethyl-p,p'-diaminodiphenylmethane 362
Tetramethyl-p,p'-diaminotriphenylmethane 363

5,6-Tetramethylene-1,2,3,4-tetrahydro-8,9-acephenanthrene 922
Tetramethylnaphthacene 753
9,10,11,12-Tetraphenylnaphthacene 754
1,2,3,4-Tetramethylphenanthrene 502
Tetraphenylmethane 364
β-(2-Tetroyl)-propionic acid 430
Thallium 84
Theelin ..... See estrone
Theelol ..... See estriol
Thiamin 1306
2-Thiobarbituric acid 1307
p-Thiocresol 365
10-Thiocyano-1,2-benzanthracene 755
9-Thiocyano-10-methyl-1,2-benzanthracene 756
10-Thiocyanomethyl-1,2-benzanthracene 757
Thiodiglycol 189
Thionol ..... See hydroxyphenthiazone
Thiouracil 1308
Thiourea 190
Thorite 85
Thorium dioxide 86
Thorotrast ..... See thorium dioxide
Thymoquinone 366
Thyroxine 367
TNT ..... See 2,4,6-trinitrotoluene
α-Tocopherol 1309
dl-α-Tocopherol 1310
dl-α-Tocopherol acetate 1311
o-Tolidine 368
Toluene 369
o-Tolueneazo-β-naphthylamine ..... See 1-o-tolylazo-2-naphthylamine 1013
p-Tolueneazo-p-toluidine ..... See p-aminoazotoluene
m-Toluidine 370
o-Toluidine 371
o-Toluidine hydrochloride 372
p-Toluidine 373
Toluidine 374
m-Toluylenediamine 375
p-Toluylenediamine 376
o-Tolylazo-β-naphthol 1044
Triacetin 191
Triarachidin 192
Triarachin ..... See triarachidin
1,2,3,4,5,6-Tribenzanthracene 948
Tribromo-3,4-benzpyrene 921
Tributyrin 193
Tricaprin 194
Tricaprylin 195
Tricerotin 196
Trichloracetic acid 197
β,β,β-Trichlorethyl carbamate 1334
10-Trichloracetyl-1,2-benzanthracene 758
1,1,1-Trichloro-2,2-bis(p-chlorophenyl)-ethane 377
Trichloroethylene 198
Triethylene glycol 199
Trihydroxyoestrin ..... See estriol
Trilaurin 200
Trilinolein 201
2,7,9-Trimethylacridine 1312
2,9,10-Trimethylanthracene 503
1,2,3-Trimethyl-4-azaphenanthrene 1313
5,7,9-Trimethyl-1,2-benzacridine 1314
5,7,9-Trimethyl-3,4-benzacridine 1315
5,9,10-Trimethyl-1,2-benzanthracene 759
6,9,10-Trimethyl-1,2-benzanthracene 760
3',3,9-Trimethylcyclopentenophenanthrene 761
2,2,4-Trimethyl-1,2-dihydrofluoranthene 762
1,12-Trimethylenechrysene 923
Trimethylene glycol 202
2,3,4-Trimethylfluoranthene 763
2,3,?-Trimethylphenanthrene 504
2,2,4-Trimethyl-1,2,3,4-tetrahydrofluoranthene 764
Trimyristin 203
Triolein 204
2,4,6-Trinitrotoluene 378
Tripalmitin 205
α,α,β-Triphenyl-α-butylene .....380 and Add.
Triphenylene 765
s-Triphenylbenzene 379
Triphenylcarbinol 381
Triphenylchlorethylene 382
Triphenylethylene 383
Tristearin 206
Truxene 949
Trivalerin 207
Tungsten 87
Tungstic oxide 88
Tyramine 384
Uraninite (pitchblende) 89
Urea 208
Urethane ..... See ethyl carbamate
γ-Valerolactone 209
Vitamin D_2 ..... See calciferol
Vitamin D_3 431

Vitamin E ..... *See* α-Tocopherol
Vitamin K_1, synthetic 432
Water 90
Xanthene 1316
Xanthone 1317
Xylene 385
Xylose 1318
Yellow AB ..... *See* phenylazo-2-naphthylamine
Yellow OB ..... *See* 1-o-tolyazo-2-naphthylamine
Yttrium (radioactive) 91
Yttrium phosphate 92
Yohimbine hydrochloride 1319
Zinc 93
Zinc acetate 94
Zinc carbonate 95
Zinc chloride 96
Zinc citrate 97
Zinc lactate 98
Zinc d-lactate 99
Zinc dl-lactate 100
Zinc malate 101
Zinc nitrate 102
Zinc oxide 103
Zinc sulfate 104
Cellosolve ..... *See* Ethylene glycol monoethyl ether

ROUTE OF APPLICATION INDEX

Numbers refer to compound numbers. Add. refers to Addenda. Oral omitted

Inhalation (and nasal insufflation) .. 12, 28, 30, 35, 48, 64, 65, 119, 120, 133, 134, 149, 151, 152, 153, 154, 155, 158, 170, 182, 198, 199, 209, 223, 229, 230, 232, 246, 292, 328, 374, 378, 406, 420, 421, 425, 883

Intraintestinal 86

Intramesenteric 1077

Intramuscular 7, 14, 19, 24, 25, 26, 27, 53, 61, 63, 79, 86, 92, 140, 149, 225, 266, 321, 373, 420, 581, 778, 801, 883, 932, 953, 955, 985, 1032, 1035, 1039, 1091, 1094, 1110, 1114, 1115, 1137, 1150, 1180, 1232, 1235, 1286, 1289

Intraperitoneal ..... 7, 17, 44, 54, 61, 65, 86, 110, 117, 120, 121, 142, 146, 147, 147 Add., 162, 162 Add., 167, 174, 178, 182, 182 Add., 223, 229, 232, 247, 258, 266, 358, 360, 387, 420, 421, 422, 423, 445, 449, 479, 487, 525, 532, 546, 547, 571, 642, 778, 801, 806, 808, 883, 985, 986, 1039, 1063, 1075, 1091, 1094, 1110, 1114, 1120, 1131, 1150, 1162, 1184, 1186, 1191, 1193, 1215, 1216, 1217, 1218, 1219, 1220, 1221, 1222, 1223, 1224, 1228, 1262, 1267, 1270, 1285, 1297, 1304, 1321, 1330 Add., 1331 Add., 1332 Add., 1333 Add., 1334 Add.

Intrathoracic 7, 60, 1091, 1110

Intratrachial 63, 86, 778, 883, 1184, 1262

Intravenous .. 8, 20, 32, 33, 47, 54, 61, 62, 63, 65, 71, 77, 85, 86, 89, 91, 99, 108, 135, 147 Add., 149, 166, 183, 213, 218, 227, 234, 236, 243, 312, 313, 314, 315, 327, 330, 334, 341, 343, 348, 350, 415, 421, 422, 445, 479, 525, 530, 614, 692, 712, 778, 801, 883, 927, 955, 985, 1035, 1037, 1038, 1040, 1063, 1077, 1160, 1169, 1186, 1191, 1254, 1226, 1285, 1323, 1325, 1326, 1328, 1329

Parenteral 1091, 1235, 1307, 1327

Subpleural 47, 61, 801, 883, 1035, 1039

SITE OF APPLICATION INDEX

Numbers refer to compound numbers
Skin (direct application) and subcutaneous tissue ommitted

Abdomen 60, 63, 86, 255, 266, 273, 338, 383, 457, 487, 571, 778, 801, 837, 838, 883, 978, 1114
Adrenal gland 86, 883, 114
Amniotic fluid 801
Anus, artificial 778, 801
Auditory canal, outer 778
Back 174, 229, 439, 450, 484, 778, 1063, 1094, 1110
Bladder 223, 232, 294, 309, 336, 337, 338, 371, 375, 376, 420, 421, 955, 985, 1035, 1039
Bone 5, 21, 22, 60, 63, 64, 86, 229, 778, 801, 883, 935, 1063, 1235
Bone marrow 22, 47, 60, 581, 778, 801, 955, 963, 985, 1114, 1137
Brain .. 60, 61, 581, 778, 801, 883, 955, 963, 985, 1063, 1137, 1292
Breast 7, 60, 63, 86, 173, 174, 266, 571, 778, 801, 883, 932, 935, 1094, 1114, 1235, 1286
Buttock 163
Crop 36, 37, 41, 42
Ear 86, 94, 144, 146, 148, 166, 174, 175, 178, 223, 321, 371, 373, 420, 614, 778, 883, 953, 955, 985, 1035, 1039, 1235, 1269, 1280, 1286
Epididymis 801
Eye 778, 883, 1035, 1235
Fallopian tube 985, 1035
Flank 421, 778
Gall bladder 60, 778, 1090
Gizzard 4, 9, 46, 48, 66
Groin 64, 69, 174, 204, 801, 1186
Kidney ... 7, 63, 58, 778, 801, 883, 955, 963, 985, 1035, 1039, 1137
Infundibulum 883
Liver ... 47, 60, 63, 581, 778, 801, 883, 955, 985, 1091, 1094, 1102, 1110, 1114, 1137
Lung 50, 58, 158, 801, 883, 985
Lymph nodes 6, 883, 1114
Mammary gland .. 104, 174, 778, 801, 883, 985, 1035, 1114
Mammary ducts 173, 174, 801
Neck 55, 721
Ovary 883
Oviduct 955, 1035
Pancreas 801, 883
Pharynx 439
Pituitary gland (hypophysis) 64, 883
Prostate 778, 883
Rectum 146, 883, 1035, 1039
Salivary gland 778, 801, 883, 1035, 1063
Seminal vesicles 883, 114
Skin (intracutaneous) 326, 778, 801, 883, 1235
Skin (through) 5, 51, 67, 310, 344, 883, 1214
Spleen ... 47, 63, 778, 801, 883, 1082, 1083, 1086, 1091, 1102, 1110, 1113, 1114, 1150
Stomach 47, 223, 778, 801, 883, 935, 1035, 1114
Submucosa of duodenum 778
Submucosa of stomach 778, 883, 935
Tail 86, 778, 783, 955, 985, 1077
Testis 23, 47, 73, 96, 99, 102, 106, 778, 801, 883, 932, 985, 1115
Thigh 778
Thymus 96, 801, 883
Thyroid gland 801, 883
Tongue 1035
Uterus 158, 778, 801, 883, 932, 985, 1094, 1110, 1114, 1130
Vagina 158, 266, 778, 801, 883, 932, 1094, 1114

SPECIES INDEX

Numbers refer to compound numbers. Add. refers to Addenda.

Amphibians and Reptiles
- Axolotl 801, 985
- Frog 801, 883, 886, 1039, 1120
- Lizard 1077
- Newt 778, 801, 1039
- Salamander 1039, 1114
- Toad 581, 778, 801, 955, 963, 985, 1134

Birds
- Dove 778
- Duck 883, 1094
- Fowl-(domestic) 7, 23, 55, 60, 63, 73, 86, 96, 102, 104, 106, 108, 266, 268, 280, 320, 322, 355, 377, 382, 383, 439, 778, 801, 883, 955, 985, 1035, 1039, 1094, 1110, 1114, 1115, 1138, 1143, 1145, 1147, 1150, 1171, 1235, 1269, 1271, 1286
- Pheasant 226, 1150, 1266
- Pigeon 4, 9, 36, 37, 41, 42, 43, 45, 46, 48, 66, 276, 388, 581, 778, 801, 883, 955, 963, 985, 1134, 1137
- Sparrow, English 1094, 1150
- Turkey 266, 377, 883, 1266

Mammals
- Cat .. 10, 11, 12, 13, 15, 29, 96, 103, 120, 331, 377, 384, 408, 410, 411, 412, 423, 439, 883, 1063, 1091, 1158, 1180, 1232
- Cow 266, 270, 276, 1232
- Deer 1150
- Dog .. 6, 30, 37, 39, 57, 71, 86, 103, 108, 110, 119, 133, 134, 135, 140, 142, 146, 151, 152, 153, 160, 170, 178, 183, 188, 190, 198, 211, 212, 216, 228, 232, 240, 266, 305, 353, 358, 377, 378, 384, 411, 412, 421, 422, 801, 883, 955, 964, 971, 978, 1003, 1024, 1025, 1026, 1027, 1032, 1035, 1063, 1077, 1094, 1114, 1137, 1150, 1160, 1161, 1171, 1175, 1176, 1220, 1254, 1269, 1279, 1293
- Ferret 778, 801
- Goat 270, 276
- Guinea pig ... 28, 52, 60, 61, 63, 86, 108, 119, 133, 134, 165, 174, 190, 222, 229, 240, 266, 270, 270 Add., 276, 308, 324, 330, 347, 371, 377, 378, 383, 421, 614, 778, 801, 883, 952, 953, 955, 976, 985, 1033, 1035, 1045, 1046, 1050, 1052, 1053, 1063, 1072, 1077, 1082, 1083, 1085, 1086, 1090, 1091, 1094, 1097, 1101, 1102, 1103, 1110, 1113, 1114, 1115, 1127, 1131, 1134, 1150,

Mammals--*(Continued)*
- Guinea pig--*(Continued)* 1219, 1226, 1285, 1288, 1289, 1328
- Hamster 266, 778, 1094
- Horse 78
- Man 266, 778, 1091, 1094, 1114
- Monkey (including baboon, drill and langur) . 28, 140, 168, 183, 186, 199, 229, 266, 411, 412, 801, 883, 1050, 1053, 1072, 1077, 1091, 1094, 1110, 1114, 1115, 1127, 1131, 1137, 1145, 1150, 1232, 1275, 1294, 1296, 1298, 1299, 1301, 1308, 1326
- Mouse (named strains only)
  - 5 801
  - XVII (17) 614, 801, 883, 1114, 1115, 1185, 1197, 1198, 1249, 1250, 1251, 1259, 1305, 1315
  - 17NC ... 64, 801, 1087, 1088, 1089, 1091, 1094, 1114, 1115, 1150
  - XIX 801
  - XXX (30) 64, 801, 1087, 1089, 1091, 1094, 1114, 1150, 1199, 1200
  - XXXIII 801
  - 39 ..... 64, 801, 1051, 1087, 1089, 1091, 1094, 1111, 1115, 1150
  - 41 ..... 64, 801
  - 42 ..... 64, 801
  - 46 1314
  - 62 801
  - 1194 801
  - A .. 6, 8, 20, 28, 65, 80, 85, 86, 89, 90, 110, 119, 123, 125, 126, 126 Add., 134, 146, 147, 147 Add., 160, 162, 162 Add., 182, 182 Add., 208, 219, 252, 266, 295, 317, 318, 339, 364, 371, 379, 383, 385, 394, 415, 416, 434, 444, 453, 455, 465, 466, 473, 481, 489, 490, 491, 504, 505, 508, 514, 518, 524, 525, 526, 528, 531, 555, 558, 564, 567, 568, 569, 570, 571, 574, 576, 579, 580, 587, 589, 591, 594, 598, 599, 600, 605, 607, 610, 611, 614, 617, 618, 619, 626, 627, 638, 642, 646, 650, 655, 661, 663, 664, 673, 679, 681, 688, 689, 691, 692, 694, 698, 700, 702, 703, 704, 705, 706, 707, 712, 719, 728, 730, 737, 739, 742, 745, 746, 747, 748, 749, 750, 766, 767, 778, 779, 780, 781, 782, 787, 788, 790, 791, 792, 793, 794, 801,

Mammals--*(Continued)*
Mouse (named strains only)--*(Continued)*
801 Add., 805, 826, 829, 830, 844, 845, 846, 855, 856, 866, 867, 869, 871, 872, 873, 875, 877, 879, 880, 883, 883 Add., 886, 887, 891, 895, 919, 920, 923, 941, 955, 963, 968, 969, 970, 972, 974, 979, 992, 993, 1035, 1039, 1063, 1068, 1075, 1077, 1088, 1094, 1110, 1113, 1114, 1115, 1134, 1150, 1162, 1163, 1186, 1187, 1191, 1193, 1196, 1215, 1216, 1217, 1218, 1220, 1221, 1223, 1224, 1238, 1244, 1263, 1264, 1265, 1295, 1330, 1331, 1332 Add., 1333 Add., 1334 Add.
ABC (A, backcross) ..... 110, 614, 778, 801, 801 Add., 883, 883 Add., 1150
AF 778
AK 778, 883
AKa 28, 80, 90, 160, 614, 1094, 1150, 1295
AVF_1-VBC 883
AW 1068, 1134
AWF_1-WBC 883
B 1115
Ba 801
Bagg 119, 162, 182, 439, 778, 801, 883
Bagg 1194 801
BBC 801
BdF_1 1114
BIH 721, 722, 761
Black Agouti 778, 883
C . 119, 123, 146, 162, 182, 223, 224, 253, 254, 266, 371, 372, 778, 792, 801, 832, 883, 884 885, 955, 958, 984, 1191
C_3H .... 86, 110, 119, 147, 190, 242, 266, 358, 383, 394, 403, 408, 412, 439, 461, 462, 463, 464, 490, 501, 513, 514, 516, 517, 521, 539, 540, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 556, 561, 562, 564, 575, 577, 579, 584, 597, 601, 609, 613, 620, 621, 637, 643, 652, 663, 672, 673, 674, 678, 681, 689, 766, 770, 778, 781, 801, 801 Add., 811, 817, 818, 862, 876, 882, 883, 883 Add., 900, 901, 904, 920, 922, 952, 955, 973, 1006, 1030, 1043, 1063, 1064, 1068, 1075, 1077, 1078, 1087, 1088, 1089, 1091, 1094, 1110, 1114, 1115, 1131, 1134, 1150, 1173, 1189, 1191
$C_{12}I$ 383, 1094, 1150
C57 .. 28, 80, 90, 117, 147, 160, 266, 358, 364, 439, 778, 801 Add., 862, 883, 883 Add., 1094, 1110, 1114, 1115, 1137, 1150
C57 black ... 65, 208, 266, 488, 614, 759, 801, 801 Add., 883, 883 Add., 886, 955, 978, 985, 992, 1006, 1068, 1075, 1115, 1134
C57 brown 614, 653, 801, 883
Caracul 801
CBA ... 117, 147, 229, 266, 383, 439, 534, 778, 801, 806, 883, 1057, 1094, 1110, 1114, 1115, 1150, 1191, 1193
CBAN 778, 883
CHI 778, 883
D .. 80, 90, 160, 223, 416, 801, 852, 863, 883, 886, 1063, 1075, 1094, 1114, 1150, 1230, 1295
dba (including Little dilute brown, Murray-Little dba, etc.) .. 126, 126 Add., 144, 229, 358, 614, 650, 654, 663, 679, 759, 778, 801, 801 Add., 803, 883, 883 Add., 955, 985, 992, 1006, 1034, 1047, 1048, 1049, 1063, 1075, 1110, 1114, 1120, 1124, 1125, 1126, 1127, 1137, 1142, 1150, 1236, 1237, 1286
DbF_1 1114
Dlb 614
D.-Z. 801
Edinburgh 1114
F 229, 883, 1094
Fordham 34
FS 383
Glaxoff 778
I ..... 801, 883, 883 Add., 955
IF 439, 778, 883
IFS 383
IVB 801
JAV 266
JAX 778
JK 266, 383, 883, 1094, 1110, 1114
K 778
L (leaden) 119, 614, 801, 883
Longacre 34
M (leaden) .. 380, 382, 426, 515, 518, 535, 663, 693, 801, 863, 883, 923, 1035, 1063, 1235
Marsh 778, 1061, 1115
Marsh-Buffalo . 96, 104, 1063, 1091, 1114, 1131, 1150, 1327
MRC 107 ..... 701, 801

Mammals--*(Continued)*
Mouse (named strains only)--*(Continued)*
MRC/H 778, 801
N 383, 801, 1094
NBT 1114
Nem 985
New Buffalo 229, 819, 883, 898, 899, 1061, 1094, 1114
NH 147, 778, 883, 1137, 1150
NHO 883
2NHO 883
Old Buffalo 1113, 1114
P.-B. 932, 934, 955
Pb 801, 985
PM 1094, 1110
RII (R2) 1114
RIII (R3) ... 64, 147, 266, 383, 439, 801, 883, 1051, 1087, 1089, 1091, 1094, 1110, 1114, 1115, 1120, 1131, 1150, 1256, 1258
RIV (R4) 801, 1114, 1115
RF 778, 883
RIC 1114
R.I.L. 1150
RPE 883
Rockland 778, 883
S_1b 778
Simpson 400, 701, 759, 778, 801, 883, 955, 977, 1114, 1189, 1190, 1191, 1194, 1195, 1248, 1273, 1275
Street 614
Swiss 229, 358, 408, 412, 487, 517, 543, 544, 545, 546, 547, 548, 550, 551, 552, 553, 554, 609, 613, 614, 620, 621, 637, 652, 690, 705, 717, 718, 770, 778, 801, 832, 883, 900, 901, 902, 904, 1301, 1303
W 801
White label (Kreyberg) 383, 439, 778, 883
Y 119, 801, 883, 955, 985
Yellow 801
Mule 78
Pig 98, 119
Rabbit ..5, 6, 14, 15, 18, 19, 21, 22, 28, 31, 33, 38, 47, 48, 52, 53, 55, 60, 61, 62, 63, 64, 68, 77, 86, 91, 94, 96, 99, 100, 102, 104, 110, 112, 119, 125, 133, 134, 135, 144, 146, 149, 158, 166, 171, 173, 174, 175, 178, 183, 184, 190, 209, 213, 216, 218, 220, 222, 223, 225, 227, 229, 230, 232, 234, 236, 238, 239, 240, 243,

Mammals--*(Continued)*
Rabbit--*(Continued)*
247, 256, 259, 260, 262, 266, 268, 276, 279, 292, 293, 298, 305, 312, 313, 314, 315, 319, 321, 326, 327, 328, 330, 331, 334, 338, 341, 343, 346, 348, 350, 352, 352 Add., 354, 367, 371, 373, 374, 377, 406, 409, 411, 412, 420, 421, 422, 423, 425, 445, 479, 487, 525, 581, 775, 778, 801, 810, 883, 886, 953, 955, 961, 985, 1030, 1035, 1039, 1040, 1043, 1063, 1091, 1094, 1110, 1114, 1115, 1127, 1134, 1137, 1150, 1179, 1191, 1226, 1232, 1235, 1254, 1261, 1269, 1280, 1285, 1286, 1307
Rat (named strains only)
1-A 1114
AB 1091
Agouti 778
August 439, 883
AxC 439, 778, 883
Black Hooded 778, 883, 985
Black Norway 190, 342, 432
Buffalo 955
Copenhagen 439
Denver 801, 883
Douredoure 1094
Evans 985
Fisher 439, 883
Hooded 778, 883
Hooded buff 883
Lister . 44, 445, 449, 487, 525, 571, 633, 642, 742, 778, 801, 883, 1186, 1245
Long-Evans 266, 985, 1114, 1150, 1308
Marshall 439, 778
Med. College of Virginia 985, 1091
Norman 883
Norway 190, 423
Osborne-Mendel 2, 6, 16, 37, 39, 72, 135, 199, 224, 289, 377, 525, 955, 985, 1150, 1171, 1240, 1241, 1296, 1298, 1303
Piebald 437, 439, 440, 1275, 1293
Rockland 985
Sherman 119, 251, 257, 359, 439, 778, 801, 980, 982, 984, 985, 1009, 1010, 1029, 1030, 1043, 1110
Silver grey 778
Sprague-Dawley .. 266, 333, 357, 487, 883, 953, 985, 1091, 1110, 1114, 1184, 1233, 1262
Slonacker 64, 86, 801, 883, 1063

Mammals--(Continued)
Rat (named strains only)--(Continued)
Stanford 1150
Sunny Hill 1293
Vanderbilt 357, 358, 1296, 1303
Wistar .. 62, 74, 110, 135, 145, 151, 152, 153, 154, 155, 190, 215, 255, 265, 266, 272, 273, 274, 277, 278, 290, 316, 320, 331, 355, 357, 358, 378, 381, 383, 405, 439, 440, 442, 445, 457, 458, 467, 477, 487, 571, 581, 742, 778, 792, 801, 837, 839, 883, 953, 955, 963, 985, 1058, 1063, 1065, 1066, 1075, 1077, 1091, 1094, 1114, 1121, 1150, 1156, 1164, 1166, 1168, 1180, 1222, 1234, 1275, 1296, 1298, 1300, 1303, 1308, 1321
Yale 159, 1114
Squirrel 985
Woodchuck 1232

TUMOR SITE INDEX

Numbers refer to compound numbers
Add. refers to Addenda

Abdomen 60, 63, 64, 675, 778, 801, 883, 886, 1002, 1082, 1083, 1086, 1091, 1094, 1102, 1103, 1110, 1113
Acoustic ducts 221, 285, 438, 439, 442
Adrenal 285, 883, 1094
Amniotic fluid 801
Anus 1063
Auditory canal, outer 778
Biliary tract 375
Bladder 135, 223, 232, 336, 337, 338, 371, 375, 376, 420, 421, 422, 439, 551, 952, 955, 959, 976, 992, 994, 1006, 1028, 1035, 1039, 1091, 1114
Blood 229, 439, 447, 554, 562, 614, 778, 801, 883, 1094, 1110, 1150, 1235
Bone 19, 21, 22, 82, 91, 108, 778, 801, 883, 1114
Bone marrow 47, 60, 62
Brain 60, 61, 778, 801, 883
Breast 7, 60, 86, 266, 438, 439, 474, 614, 778, 801, 883, 932, 1114, 1115
Bronchial tubes 28
Bronchus 147
Buttock 163
Colon 91, 439, 1114
Diaphragm 7
Ear 55, 94, 174, 175, 883, 935, 953, 1035, 1039
Endometrium 1094, 1103
Epididymis 801
Eye 883
Fallopian tube 86, 985
Fetus 190
Gall bladder 778
Groin 64, 69, 801
Heart 508, 883
Infundibulum 883
Intestine 7, 64, 439, 713, 801, 883
Intracutaneous tissue 883
Jaw 86, 801
Kidney ... 7, 63, 103, 420, 438, 464, 490, 778, 801, 883, 952, 953, 1063, 1091, 1166, 1186
Kidney pelvis 371, 439
Lip 778
Liver 5, 47, 60, 63, 119, 125, 232, 233, 285, 311, 337, 361, 375, 390, 391, 438, 439, 440, 476, 525, 711, 712, 713, 752, 760, 778, 801, 819,
Liver--*(Continued)* 883, 952, 953, 955, 959, 965, 966, 967, 973, 976, 979, 985, 992, 1002, 1006, 1009, 1010, 1013, 1014, 1015, 1016, 1017, 1018, 1019, 1020, 1022, 1028, 1035, 1036, 1063, 1074, 1094, 1102, 1110, 1114, 1150, 1163, 1191, 1235
Lung ..... 5, 22, 35, 55, 64, 65, 86, 147, 147 Add., 162 Add., 182 Add., 229, 235, 285, 417, 421, 438, 439, 446, 449, 464, 476, 492, 502, 508, 511, 517, 530, 542, 543, 546, 547, 550, 551, 554, 609, 613, 614, 621, 637, 680, 690, 692, 712, 723, 767, 770, 778, 781, 782, 801, 803, 810, 826, 846, 862, 883, 884, 885, 886, 901, 904, 923, 927, 929, 932, 955, 985, 1035, 1063, 1091, 1134, 1186, 1189, 1191, 1193, 1215, 1216, 1217, 1218, 1220, 1221, 1222, 1223, 1224, 1330 Add., 1331 Add., 1332 Add., 1333 Add., 1334 Add.
Lymph nodes 64, 229, 266, 285, 614, 780, 782, 801, 839, 862, 883, 904, 1061, 1087, 1089, 1090, 1091, 1094, 1110, 1114, 1150, 1235, 1308
Mammary gland 48, 61, 64, 104, 190, 221, 229, 266, 268, 285, 383, 388, 395, 439, 614, 680, 801, 839, 842, 873, 883, 952, 973, 1006, 1061, 1087, 1089, 1090, 1091, 1094, 1110, 1113, 1114, 1115, 1131, 1138, 1150
Mesentery 1114
Mesoblast 108
Mouth 232, 233, 883
Muscle 79, 92, 778, 801, 883, 932, 1135
Ovary 266, 614, 778, 801, 883, 1094, 1114
Oviduct 1035
Pancreas 103, 439
Perineum 883
Peritoneum 7, 61, 86, 258, 387, 778, 801, 806, 883
Pituitary 64, 778, 1091, 1094, 1114
Pleura 61, 124, 504, 801, 1221
Prostate 778, 883
Pyloric stomach 883
Pylorus 464
Rectum 146, 664, 883
Salivary gland 619, 721, 778, 801, 883
Seminal vesicles 883
Shoulder 770, 1186

Spleen 47, 86, 276, 778, 801, 883, 1082, 1083, 1086, 1091, 1094, 1101, 1102, 1110, 1114
Stomach 47, 55, 84, 257, 311, 361, 391, 446, 464, 513, 560, 572, 574, 675, 715, 740, 778, 801, 883, 953, 965, 981, 985, 990, 1005, 1043, 1058, 1063, 1067, 1091, 1094, 1101, 1114, 1186, 1189
Tail 778, 801, 883
Testis ... 23, 47, 96, 102, 104, 266, 383, 713, 778, 801, 839, 883, 932, 1094
Thigh 778
Thorax 60, 778, 801, 1094
Thymus 96, 449, 614, 801, 955, 1089, 1114
Thyroid 190, 438, 801, 883, 955
Trachia 778, 883
Ureter 371, 439, 740
Uterus ..... 48, 266, 270, 270 Add., 271, 276, 778, 801, 883, 932, 1086, 1091, 1094, 1102, 1110, 1113, 1114, 1115, 1150
Vagina 801, 883, 932, 1094

VEHICLE INDEX

Numbers refer to compound numbers. Add. refers to Addenda

Acetone 6, 106, 107, 111, 127, 128, 129, 130, 131, 132, 139, 148, 158, 161, 189, 197, 241, 244, 250, 266, 278, 291, 296, 297, 348, 440, 441, 449, 450, 484, 501, 525, 558, 614, 664, 696, 701, 702, 741, 759, 778, 792, 801, 827, 828, 835, 858, 866, 1063, 1181, 1185, 1191, 1197, 1198, 1199, 1200, 1212, 1249, 1250, 1251, 1258, 1259, 1260, 1305, 1314, 1315

Alcohol.... 6, 34, 55, 130, 223, 237, 248, 266, 365, 421, 448, 532, 1075, 1088, 1091, 1113, 1114, 1117, 1130, 1182, 1285

Alcohol-benzene 1075, 1077

Alcohol-glycerol 237

Aniline 232

Beeswax-mineral oil 1180, 1232

Benzene (benzol) ..... 161, 229, 232, 235, 242, 245, 299, 299 Add., 300, 303, 304, 307, 332, 338, 340, 364, 366, 379, 380, 383, 388, 391, 392, 398, 399, 400, 401, 402, 403, 407, 413, 414, 417, 418, 419, 424, 429, 430, 433, 435, 443, 445, 446, 451, 452, 456, 459, 460, 461, 462, 463, 464, 467, 468, 469, 470, 471, 472, 473, 475, 477, 478, 481, 483, 485, 486, 487, 492, 493, 494, 495, 496, 497, 498, 499, 500, 502, 509, 512, 513, 516, 523, 525, 540, 541, 542, 543, 557, 558, 559, 560, 561, 563, 571, 573, 581, 585, 588, 592, 601, 602, 603, 604, 608, 612, 614, 616, 621, 622, 623, 625, 628, 629, 631, 632, 634, 635, 636, 639, 640, 641, 642, 643, 644, 645, 647, 648, 649, 651, 662, 664, 667, 668, 669, 670, 671, 673, 674, 675, 676, 677, 680, 687, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 711, 712, 713, 714 715, 720, 721, 722, 726, 733, 735, 736, 738, 739, 740, 741, 742, 751, 752, 753, 754, 759, 760, 761, 762, 763, 764, 765, 768, 769, 773, 775, 777, 778, 783, 786, 789, 792, 794, 796, 797, 800, 801, 802, 805, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 836, 839, 847, 848, 849, 850, 851, 864, 873, 874, 876, 878, 883, 892, 893, 894, 896, 897, 903, 905, 906, 907, 908, 909, 910, 911, 913, 914, 916, 917, 918, 920, 924, 925, 926, 928, 934, 936, 938, 939, 940, 942, 943, 944, 945, 946,

Benzene (benzol)--*(Continued)* 947, 948, 949, 954, 955, 965, 966, 967, 977, 979, 985, 992, 1030, 1057, 1059, 1060, 1074, 1080, 1081, 1086, 1088, 1090, 1091, 1094, 1113, 1114, 1115, 1117, 1128, 1166, 1167, 1172, 1174, 1182, 1186, 1187, 1189, 1190, 1191, 1192, 1194, 1195, 1201, 1203, 1204, 1207, 1208, 1209, 1210, 1239, 1242, 1248, 1263, 1266, 1273, 1276

Blood, rabbit 421

Butyl phthalate 883

Butyl stearate 883

Butyric acid 801

Cetane 778

Cephalin 778

Chloroform 371, 571, 778, 801, 883, 1114

Cholesterol 266, 267, 581, 778, 801, 883, 963, 985, 1035, 1037, 1038, 1039, 1075, 1077, 1091, 1110, 1114, 1131, 1137

Collodion ... 63, 220, 223, 232, 294, 309, 336, 337, 338, 371, 375, 376, 420, 421

Crystals (including pellets, metallic granules, liquids, rods and other forms of the pure substance) 4, 6, 9, 21, 28, 31, 35, 36, 46, 48, 65, 66, 86, 110, 119, 126, 126 Add., 149, 151, 152, 153, 154, 170, 198, 208, 209, 229, 232, 255, 265, 266, 270, 272, 273, 274, 276, 277, 278, 292, 294, 318, 320, 328, 335, 346, 355, 371, 374, 375, 376, 379, 381, 383, 405, 406, 420, 421, 425, 426, 434, 439, 453, 455, 457, 458, 459, 461, 462, 463, 464, 465, 466, 467, 473, 477, 481, 487, 489, 490, 491, 505, 508, 509, 514, 515, 518, 524, 525, 526, 528, 531, 539, 540, 555, 558, 564, 565, 566, 568, 569, 570, 574, 576, 574, 578, 579, 580, 581, 587, 589, 591, 594, 597, 598, 599, 600, 605, 606, 618, 619, 626, 627, 642, 650, 651, 653, 654, 661, 663, 664, 673, 679, 681, 688, 689, 691, 692, 693, 694, 698, 700, 702, 703, 705, 706, 707, 708, 712, 713, 714, 719, 725, 728, 730, 737, 739, 742, 745, 746, 747, 748, 749, 750, 766, 767, 778, 779, 780, 781, 782, 787, 788, 790, 791, 792, 793, 798, 801, 803, 826, 829, 830, 837, 838, 844, 846, 852, 855, 856, 858, 859, 863, 865, 866, 869, 871, 872, 873, 875, 876,

Crystals (including pellets, metallic granules, liquids, rods and other forms of the pure substance)-*(Continued)*
877, 879, 880, 883, 885, 887, 891, 895, 919, 920, 922, 927, 941, 952, 955, 963, 968, 969, 970, 972, 973, 974, 978, 981, 992, 1004, 1006, 1035, 1045, 1047, 1048, 1049, 1050, 1052, 1053, 1058, 1063, 1068, 1074, 1075, 1077, 1078, 1082, 1083, 1086, 1091, 1094, 1102, 1103, 1105, 1109, 1110, 1113, 1114, 1115, 1120, 1124, 1125, 1126, 1127, 1131, 1134, 1137, 1138, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, 1150, 1151, 1152, 1153, 1157, 1159, 1160, 1166, 1173, 1176, 1182, 1184, 1196, 1205, 1206, 1214, 1219, 1228, 1229, 1230, 1236, 1237, 1238, 1244, 1263, 1264, 1265, 1281, 1299, 1301, 1302, 1304, 1306, 1307, 1308, 1319, 1320, 1321, 1322, 1323, 1324, 1325, 1327, 1329

Desoxycholic acid solution in water 778
Dextrin 883
Dextrose 166
Diethylene glycol 358
Dimethyl phthalate 377
Dioxane 883
Egg albumin 614, 801, 985, 1035
Emulsions
- Lard, in serum 801
- Lard, in water 801
- Lecithin, in water 801
- Mineral oil 883
- Mouse fat, in water 801
- Olive oil 801, 883, 963, 985, 1039

Ether 119, 371, 421, 778, 883,
Ether-benzene 778
Ethyl esters of fatty acids 1309
Ethyl linoleate 778
Ethyl oleate 778
Ethyl palmitate 778
Ethyl stearate 778
Fat
- Bacon 766
- Beef (tallow) 778, 801
- Chicken 801, 883
- Egg yolk 801
- Guinea pig 778
- Mouse 571, 778, 883, 801
- Rabbit 932, 953, 955, 1035, 1039, 1235, 1286
- Rat 614, 778, 883

Fatty medium (including fat) 571, 778
Formalin 158
Food .... 1, 2, 3, 6, 10, 11, 13, 16, 18, 37, 39, 41, 45, 52, 55, 71, 72, 76, 78, 81, 83, 87, 88, 93, 95, 96, 98, 103, 104, 105, 110, 112, 113, 115, 118, 121, 135, 137, 143, 145, 146, 147 Add., 149, 152, 156, 157, 160, 162 Add., 164, 166, 168, 169, 170, 172, 173, 174, 175, 177, 179, 181, 182 Add., 183, 186, 187, 190, 191, 192, 193, 194, 195, 196, 199, 200, 201, 202, 203, 204, 205, 206, 207, 211, 214, 215, 222, 223, 224, 226, 227, 340, 251, 257, 266, 268, 280, 281, 282, 286, 287, 289, 290, 291, 292, 308, 319, 322, 329, 331, 338, 342, 351, 353, 357, 358, 360, 361, 368, 375, 377, 378, 391, 403, 404, 423, 420, 421, 423, 435, 436, 437, 438, 439, 440, 441, 447, 473, 474, 476, 484, 525, 571, 621, 742, 778, 801, 883, 950, 951, 952, 953, 955, 956, 957, 961, 963, 971, 976, 977, 978, 980, 981, 982, 984, 985, 986, 987, 988, 989, 990, 991, 992, 994, 996, 997, 998, 999, 1005, 1006, 1009, 1010, 1011, 1012, 1013, 1014, 1015, 1028, 1029, 1030, 1031, 1035, 1036, 1037, 1038, 1039, 1044, 1058, 1063, 1068, 1075, 1114, 1155, 1156, 1164, 1170, 1171, 1180, 1222, 1223, 1228, 1233, 1240, 1241, 1271, 1272, 1275, 1282, 1284, 1285, 1287, 1293, 1296, 1298, 1300, 1301, 1303, 1308, 1309, 1311, 1316, 1317, 1318, 1325, 1326, 1332 Add., 1333 Add., 1334 Add.
Gelatin solution in water 445, 487, 525, 778, 801, 985, 1030
Glass capsule 60, 61, 63, 64
Glycerol (glycerine) .. 63, 252, 373, 391, 460, 461, 462, 463, 464, 501, 502, 513, 526, 553, 601, 609, 637, 643, 674, 778, 801, 817, 818, 883, 900, 915, 955, 958, 984, 1030, 1054, 1055, 1056, 1057, 1189
Gum
- acacia, solution in water 103, 358, 412
- arabic, solution in water 6, 10, 13, 432, 952, 985, 1035
- tragacanth, solution in water 349, 1275

Hydrochloric acid 266, 319, 421, 955
Lanolin 321, 614, 883, 949, 1035, 1039, 1157
Lard .. 174, 215, 223, 295, 317, 326, 337, 358, 415, 416, 426, 444, 487, 504, 525, 527, 529, 535, 537, 567, 571, 581, 598, 600, 607, 610, 611, 614, 617, 646, 651, 663, 676, 680, 688, 689, 692, 704, 705, 706, 758, 766, 778, 792, 794, 796,

Lard--*(Continued)*
801, 835, 845, 862, 867, 877, 883, 914, 917, 923, 1035, 1063, 1166, 1191, 1268, 1286
Lard-glycerol mixture 219
Lecithin 778
Liver lipins 778
Methyl caprate 778
Methyl salicylate 883
Mouse lipoids 778
Oil
almond 778, 801, 883, 992
bran 778
coconut 291, 1058
cod liver 52, 778, 801
corn ... 169, 240, 266, 377, 388, 431, 801, 883, 955, 1014, 1084, 1114, 1130, 1137, 1309
cottonseed 778, 983, 984, 985, 1017, 1018, 1019, 1020
croton 778
from metabolism of rabbit 833
linseed 614, 883, 1093
litmus 801
mineral 119, 237, 778, 801, 883, 1035
olive .... 52, 69, 116, 119, 125, 173, 184, 223, 229, 230, 238, 253, 256, 266, 270, 270 Add., 287, 321, 338, 358, 361, 371, 373, 375, 377, 387, 420, 439, 445, 542, 614, 778, 792, 801, 809, 810, 824, 835, 883, 884, 885, 929, 953, 955, 956, 963, 977, 978, 985, 986, 992, 996, 1006, 1011, 1021, 1022, 1035, 1037, 1038, 1039, 1050, 1051, 1063, 1068, 1075, 1094, 1097, 1101, 1102, 1103, 1110, 1114, 1115, 1120, 1131, 1138, 1150, 1183, 1191, 1235, 1280, 1286
paraffin 122, 125, 801, 949, 1037
peanut 140, 210,221, 240, 267, 269, 283, 284, 285, 325, 377, 392, 395, 427, 439, 595, 657, 659, 680, 684, 801, 840, 841, 842, 883, 953, 985, 1063, 1074, 1077, 1091, 1094, 1114, 1127, 1131, 1150, 1191
poppyseed 1235
sesame . 109, 229, 258, 266, 270, 364, 379, 383, 408, 412, 439, 445, 460, 461, 462, 463, 464, 487, 503, 509, 516, 518, 523, 525, 558, 560, 561, 563, 571, 573, 590, 614, 616, 621, 622, 633, 635, 641, 642, 644, 651, 662, 664, 669, 675, 680, 687, 694, 696, 702, 711, 712, 713, 714, 715, 720, 721, 722, 740, 741, 742, 760, 761, 768, 778, 784, 792, 801, 807, 814, 815, 816,

Oil--*(Continued)*
sesame--*(Continued)*
819, 820, 827, 828, 831, 839, 861, 883, 884, 885, 889, 898, 899, 954, 965, 966, 967, 979, 985, 992, 1046, 1050, 1052, 1053, 1061, 1063, 1064, 1069, 1070, 1071, 1072, 1075, 1077, 1079, 1081, 1085, 1087, 1088, 1089, 1091, 1092, 1094, 1095, 1096, 1099, 1100, 1101, 1104, 1105, 1106, 1107, 1108, 1109, 1110, 1111, 1112, 1114, 1115, 1116, 1118, 1127, 1129, 1131, 1132, 1133, 1135, 1136, 1137, 1138, 1143, 1146, 1147, 1150, 1153, 1154, 1186, 1187, 1191, 1310
sperm 801
sunflowerseed 158, 778, 801, 883, 932, 934, 935, 955, 1063
vaseline 778
vegetable 158, 801, 1091, 1114
unspecified 263, 266, 267, 271, 331, 382, 383, 538, 778, 937, 1039, 1063, 1077, 1087, 1089, 1090, 1091, 1094, 1098, 1110, 1114, 1115, 1122, 1123, 1131, 1138, 1150
Oleic acid 231, 571, 778, 801, 936, 949
Ox brain extract 778
Paraffin 60, 61, 63, 130, 231, 443, 571, 614, 634, 702, 742, 778, 801, 883, 1035, 1166, 1167, 1239, 1266
Physiol. solution 824
Platinum needle (or tube) 60, 63
Postonal 614
Propylene glycol 270, 439, 473, 474, 614, 630, 741, 870, 1076, 1285
Resin pearls 223
Salve 84, 220, 232, 421, 778, 801
Sebaceous material from dermoids 500, 918
Serum
dog 801
horse 778, 801, 883
horse serum-cholesterol 883
rabbit 33, 387, 421
Soap solution 778
Sodium cholestenone sulfonate solution in water 778
Spermaceti 883
Stanolex fuel 331
Tetralin 918, 925, 936
Tributyrin 1183, 1201, 1202, 1203, 1253
Thread impregnation ... 5, 51, 59, 63, 67, 310, 344, 801, 883
Tricaproin 883

Tricaprylin 483, 506, 507, 510, 511, 517, 521, 525, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 556, 562, 575, 583, 584, 596, 609, 613, 614, 620, 621, 637, 651, 652, 656, 658, 672, 678, 682, 683, 685, 686, 690, 692, 705, 710, 717, 718, 727, 755, 756, 757, 766, 770, 778, 801, 811, 847, 849, 882, 883, 896, 897, 900, 901, 902, 904, 927, 1174, 1186, 1204, 1207, 1209
Tricaprylin-trilaurin 883
Vapor .. 28, 119, 209, 223, 229, 232, 328, 346, 374, 406, 420, 421, 425
Vaseline (petrolatum, pomade) .. 6, 47, 60, 445, 449, 778, 883
Water (including saline, Ringer solution, solutions of acids and alkalies) 5, 7, 8, 20, 22, 23, 28, 44, 47, 50, 55, 56, 58, 59, 60, 61, 62, 63, 65, 73, 74, 75, 77, 80, 85, 89, 94, 96, 99, 102, 104, 106, 110, 135, 136, 137, 138, 141, 143, 146, 147, 149, 150, 160, 163, 166, 174, 175, 178, 180, 183, 185, 190, 199, 223, 224, 225, 232, 247, 254, 266, 308, 319, 323, 326, 333, 338, 342, 348, 352, 358, 360, 372, 375, 420, 421, 422, 445, 449, 479, 488, 490, 519, 520, 522, 525, 530, 532, 533, 543, 544, 546, 547, 550, 551, 571, 572, 586, 593, 614, 624, 665, 666, 692, 712, 716, 731, 732, 743, 744, 765, 778, 781, 801, 803, 806, 809, 832, 883, 885, 927, 955, 975, 978, 985, 993, 1000, 1001, 1002, 1003, 1008, 1021, 1023, 1024, 1027, 1034, 1062, 1063, 1074, 1075, 1077, 1094, 1113, 1114, 1121, 1161, 1162, 1163, 1165, 1171, 1175, 1177, 1178, 1183, 1186, 1188, 1191, 1193, 1215, 1216, 1217, 1218, 1220, 1221, 1222, 1223, 1224, 1225, 1227, 1228, 1233, 1235, 1243, 1245, 1246, 1253, 1254, 1256, 1257, 1261, 1277, 1279, 1286, 1290, 1291, 1292, 1295, 1327, 1328, 1330, 1331
Water (including saline, Ringer solution, solutions of acids and alkalies)--*(Continued)*
Xylene 778, 925, 926, 946, 948, 949